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DEFENSE SYSTEMS MANAGEMENT COLLEGE



PROGRAM MANAGEMENT COURSE INDIVIDUAL STUDY PROGRAM

MANAGEMENT OF NAVY
TEST AND EVALUATION MILESTONES

STUDY PROJECT REPORT
PMC 77-2

George A. Bowley
Commander USN

DDC

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DEFENSE SYSTEMS MANAGEMENT COLLEGE

STUDY TITLE: MANAGEMENT OF NAVY TEST AND EVALUATION MILESTONES

STUDY PROJECT GOALS:

To identify the DoD and Navy requirements which dictate the need for intensive management of test and evaluation milestones, and to define the framework of a computerized data base of milestone information which can be used to develop structured information status reports for senior management personnel.

STUDY REPORT ABSTRACT:

The report briefly identifies the requirement to establish viable test and evaluation monitoring during the acquisition of major systems and equipment, and recognizes the significance of the test and evaluation effort as a prerequisite for successful Defense System Acquisition Review Council (DSARC) decisions and the further commitment of development and production funding. It further recognizes that organizational commanders now require a more integrated overview of command test and evaluation efforts so that they may speak with a more viable corporate voice.

This study report examines the functions and capabilities of Naval Material Command (NAVMAT) Test and Evaluation Coordinators to provide this type of overall assessment and concludes that no administrative support system yet exists to enable the coordinator to collect and display corporate test and evaluation data in usable report formats.

The report proposes a computerized test and evaluation data system and defines specific input and report output formats that are needed by the organization to assess test and evaluation status. Ideas for future system sophistication are provided, and sample report formats are included in the appendix.

Although this report concentrates on Naval Material Command requirements, its test and evaluation data concepts are equally applicable to other Navy organizations, other Services and other areas of endeavor as well.

SUBJECT DESCRIPTORS:

Test and Evaluation (10.08.00.00)

Management Information Systems (10.02.05.02)

NAME, RANK, SERVICE	CLASS	DATE
George A. Bowley, CDR, USN	PMC 77-2	November 1977

MANAGEMENT OF NAVY
TEST AND EVALUATION MILESTONES

Individual Study Program
Study Project Report
Prepared as a Formal Report

Defense Systems Management College
Program Management Course
Class 77-2

By

George A. Bowley
Commander USN

November 1977

Study Project Advisor
Commander Herb Woods, USN

This study project report represents the views, conclusions and recommendations of the author and does not necessarily reflect the official opinion of the Defense Systems Management College or the Department of Defense.

EXECUTIVE SUMMARY

Changes in acquisition policy in the 1970's have placed increased emphasis on the importance of the test and evaluation (T&E) process and on the success of certain T&E milestones as prerequisites to Defense System Acquisition Review Council (DSARC) decisions and the commitment of further developmental and production funds. Accordingly, there is an increasing need within all Department of Defense (DoD) communities to provide more visibility to critical T&E events and to assess their significance within the overall process.

Program and Acquisition Managers normally coordinate the major portion of test and evaluation efforts within the framework of their individual internal organizations; coordinating unique problems and specific requirements with higher authority on an as occurring or as required basis. In this current environment of complex acquisitions, organizational commanders now need a more integrated and consistent report of T&E status in a corporate sense; a means of assessing the total T&E posture across all boundaries of the organization. Within the Naval Material Command, Test and Evaluation Coordinator positions have been established to provide such a service, but no administrative support system has yet been devised to enable that coordinator to collect and easily display corporate T&E data in flexible and diverse report formats. This report proposes the development of a computer data base of T&E milestone information to accomplish this purpose.

There is an inherent human resistance to the use of management information systems (MIS) as a solution to problems such as this. One reason is that the MIS is not capable of managing anything, but is often sold to managers on this premise. Consequently, volumes of unusable paper are generated and

discarded daily with no particular function being performed.

On the contrary, the information system proposed herein is designed to be functional. Its purpose is to collect T&E milestone data, primarily contained in Test and Evaluation Master Plans (TEMPS) and other program sources, and reconstruct the data into useable information tools for senior managers. The computer output reports described in this paper include Box Scores concerning document preparation, Reports of Overdue Milestones and Major Milestone Listings sorted by a number of grouping options.

Although this paper is oriented toward the needs of the Naval Material Command (NAVMAT) and Naval Systems Commands (SYSCOMs), the test and evaluation reporting procedures discussed are also applicable to T&E organizations in other Navy commands and in other Services as well. In addition, the concepts of data collection, storage, flexible sort-print techniques and their utility in solving numerous coordination problems of any type are equally applicable in other areas of endeavor. This paper hopes to stimulate thought toward that end.

ACKNOWLEDGMENTS

I wish to thank my wife and three daughters for their patience and understanding during my mental absence these past few months.

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APPENDIX K: Sample Report - TEMP/TEP Update Status Report

BIBLIOGRAPHY

1.0 INTRODUCTION

1.1 PURPOSE

I can't think of anything more exciting (other than walking barefoot on hot rocks) than to pick up a paper entitled "A statistical Analysis of the Failure Rate of Wirewound Resistors in VHF Receivers Deployed in Tropical Satellite Ground Stations" and leaf through its contents. True, the author probably devoted six months of intensive research effort, personally derived the forty-five pages of mathematical formulas, and came to the honest conclusion that half-watt resistors last for at least three years if you don't leave the receiver out in the rain longer than 2.34 hours. I grant that such a paper would probably be considered an academic achievement and, to someone designing Brazilian satellites, may save a significant amount of engineering design work. But, to 99% of us, it is a paper that will probably be read once, graded by a professor and placed on a shelf - never to be seen again (except for those who know the author, because he ordered 2000 extra copies for his friends).

On the contrary, my purpose is to write a paper which is functional; which provides a useful product that can be applied and implemented. In this particular case, to propose a better way of providing visibility to critical test and evaluation milestones within the Naval Material Command. In addition, it is hoped that my approach will provide "food for thought" for others who might find some application in similar situations.

1.2 OBJECTIVES

The objectives of this paper are as follows:

- To describe a requirement within the Naval Material Command to properly coordinate data concerning test and evaluation milestones.
- To briefly discuss the motivating DoD, OPNAV and Material Command test and evaluation policies and environment which dictate this requirement.
- To develop the framework of a data collection and information system to satisfy this need.

It is also important to mention the "non-objectives" - those areas which will not be addressed due to existing time constraints:

- This paper does not provide a detailed description of the evolution of test and evaluation in the Department of Defense or in any particular service. The reader is referred to the Bibliography where a number of excellent consolidations are listed which relate the findings of the Blue Ribbon Defense Panel in 1970 and the subsequent actions which evolved. There will, however, be a brief discussion of these policies for the purpose of providing a baseline knowledge of test and evaluation management requirements.
- Similarly, this paper does not attempt to enter the arena of the pros and cons of management information systems in general. Again, the Bibliography lists a number of documents which specifically treat the subject as it applies to Project Management Offices.
- No research has been conducted regarding other test and evaluation data bases and manual/computer information systems existing at other commands or within other Services. There are many excellent management schemes that exist at commands such as Commander

Operational Test and Evaluation Force (COMOPTEVFOR). This paper attempts only to provide a system tailored to the needs of a Naval Systems Command Test and Evaluation Coordinator.

- The principles discussed in this paper are not easily applied to some program areas such as the ship acquisition process per se because of their complexity and uniqueness. The proposed approach to a test and evaluation information system may not have an immediate application in these cases; however, the concept of data collection, consolidation and control is still a basic need in many areas.

1.3 SCOPE

This section will briefly describe the contents of the remainder of the paper in order to illustrate the continuity of presentation.

1.3.1 Background

In Section 2.0 the basic DoD policies concerning test and evaluation are discussed, including a description of how the Navy translated these policies, through Secretary of the Navy (SECNAV) and Chief of Naval Operations (CNO) directives, into requirements for implementation by major and subordinate commands. Section 2.0 will also define unique Acquisition Categories (ACATs) which determine, in accordance with dollar thresholds, how acquisition projects are managed. The requirement to prepare and implement a Test and Evaluation Master Plan (TEMP), and the requirement to obtain an Approval for Service Use (ASU) for a particular equipment or system prior to obtaining a release of production funds, are also discussed.

1.3.2 Management of T&E Milestones Within the Naval Material Command

Section 3.0 discusses Material Command T&E directives and briefly describes the Systems Command (SYSCOM) T&E Coordinator organization and functions. The section continues with a discussion of the requirement to adequately document and coordinate test and evaluation milestone information on the System Command level and to identify current T&E Coordinator capabilities to provide this degree of detailed management. The section concludes that additional assistance is required and proposes the concept of a T&E information data base as a possible solution.

1.3.3 Development of an Information System

Section 4.0 provides a short discussion on the value of having an information system (not necessarily a MANAGEMENT information system) to

assist in performing certain functions, and relates this need to the test and evaluation coordinator responsibilities previously discussed.

1.3.4 Development of a Test and Evaluation Information System

Section 5.0 and 5.1 continue to define specific types of test and evaluation milestone data contained in TEMPs and consolidates this data into appropriate input categories (Section 5.2) for use in a data base matrix from which variations of information can be sorted, extracted and printed in specific report formats. Section 5.3 describes these output formats which include monthly box scores and milestone summaries in numerous categories.

1.3.5 Summary

Section 6.0 provides a summation of the report and discusses potential implementation procedures which should be considered. The section also addresses certain thoughts on future system expansion and sophistication.

1.3.6 Appendix and Bibliography

The Appendices contain supplementary information on the contents of TEMPs, System Command T&E Coordinator functions, a sample Input Data Worksheet and, most importantly, a computer output report sample of each type of format discussed in Section 5.3. It is strongly recommended that the reader briefly scan these samples before proceeding further into the report - the advantages of having reports like these will be obvious.

The Bibliography is divided into topic groups in order to more clearly identify certain areas of discussion not addressed in detail in this paper. A number of references (Individual Study Projects) are included since these efforts "zero-in" on specific areas of interest as opposed to some "general philosophy" type of references.

2.0 BACKGROUND

2.1 GENERAL

In the 1960's, Secretary of Defense McNamara directed that the acquisition of defense systems be accomplished by using a concept of Total Package Procurement. This concept involved extensive systems analysis and development of paperwork approaches which were used as the basis for subsequent research, development and production (usually by a single contractor). There was a general concern about this total package philosophy since such early commitments virtually eliminated any flexibility to vary approaches and exercise innovative thinking along the path from concept to operational deployment.

In 1970, a Blue Ribbon Defense Panel concluded that a more effective approach to systems acquisition would be to set achievable goals at the onset and incrementally develop and test along the way to demonstrate achievement of these goals. The Panel focused upon the need to establish viable test and evaluation policies, not only in the developmental testing of hardware and prototypes, but also in the testing of operational performance prior to the commitment of major production funds.

This background section will identify DoD policy guidance that was issued as a result of this revaluation, and will briefly discuss how that policy was generally interpreted and implemented by the Secretary of the Navy (SECNAV) and the Chief of Naval Operations (CNO). As indicated earlier, this paper will not delve into the historical details of these policies, but will lightly expose the reader to the baseline requirements which drive the need to properly coordinate test and evaluation milestones.

2.2 DEPARTMENT OF DEFENSE (DOD) POLICY

2.2.1 DoD Directive 5000.1

Following the Blue Ribbon Defense Panel's recommendations, Secretary of Defense Packard issued DoD Directive 5000.1 in July of 1971 which primarily divided the acquisition process into five discernible phases; identified the need to incrementally review the progress of the program at specific milestone points (by a body known as the Defense System Acquisition Review Council (DSARC)), and make decisions whether or not to continue the effort and commit additional developmental and production funds. The directive further identified test and evaluation as one key means of providing supporting inputs to the prescribed review process.

This guidance was further revised by Secretary of Defense Clements by reissuing DoD Directive 5000.1 on 18 January 1977, which divided the acquisition process into the following sequence of key milestone decision points and phases:

- MILESTONE 0 (Program Initiation)
 - Conceptual Phase
- MILESTONE I
 - Demonstration and Validation Phase
- MILESTONE II
 - Full Scale Engineering Development Phase
- MILESTONE III
 - Production and Deployment Phase

The acquisition process is initiated with the approval of a Mission Element Needs Statement (MENS) and continues through a sequence of decision events (Milestones and DSARC reviews) designed to evaluate and recognize the achievement of established program objectives.

DoD Directive 5000.1 does not specifically spell out the mechanics of how test and evaluation will be implemented within these phases, but instead provides the following general policy (1:8)¹:

" U. Test and evaluation shall commence as early as possible. An estimate of military utility and of operational effectiveness and operational suitability including logistic support requirements, shall be made prior to large-scale production commitments. The most realistic test environment possible and an acceptable representation of the future operational system will be used in the testing. "

2.2.2 DoD Directive 5000.2

Whereas DoD Directive 5000.1 establishes the overall policies for the acquisition process, DoD Directive 5000.2 (also issued in January 1977) provides procedures to implement this guidance, establishes review councils, assigns responsibilities and further defines the milestone decision points and acquisition phases by describing specific detailed actions to be accomplished. Test and evaluation is not referred to as a separate action. More importantly it is treated as a "given"; an assumption which permeates each of the other actions such as stating needs for "demonstrations at the system level", references to "supporting OT&E" and the like. A significant single recognition of test and evaluation, however, is reflected by including a T&E Advisor to the DSARC with the following responsibility (2:Encl 1) :

" The Deputy DDR&E (T&E) shall participate in DSARC reviews and shall report to the DSARC and to the Secretary of Defense on test planning and results"

¹ The notation (#:#) is used in this report to identify the applicable reference for the fact or quote stated. The first digit is the number of the reference as listed in the bibliography appearing at the end of the paper. The second digit identifies the page number within that reference.

2.2.3 DoD Directive 5000.3

This directive, entitled "Test and Evaluation", is the key policy document which governs the implementation of T&E throughout all DoD Components, and is the basis for the Navy T&E directives and guidance discussed in subsequent sections. The directive defines certain types of T&E to be performed during the acquisition cycle as follows:

- Development Test and Evaluation (DT&E)

DT&E is that test and evaluation conducted to:

- Demonstrate that the engineering design and development process is complete.
- Demonstrate that the design risks have been minimized.
- Demonstrate that the system will meet specifications.
- Estimate the system's military utility when introduced.

- Operational Test and Evaluation (OT&E)

OT&E is that test and evaluation conducted to:

- Estimate the prospective system's
 - Military Utility
 - Operational Effectiveness
 - Operational Suitability

including compatibility, interoperability, reliability, maintainability, and logistic training requirements.

- Provide information on organization, personnel requirements, doctrine and tactics.
- Provide data to support or verify material in operating instructions, publications and handbooks.

- Production Acceptance Test and Evaluation (PAT&E)

PAT&E is test and evaluation of production items to:

- Demonstrate that the items procured

fulfill the requirements and specifications of the procuring contract or agreements.

In addition to the three major test and evaluation categories listed above, DoD Directive 5000.3 also provides for:

- Test and Evaluation for Major Ships of a Class
- Test and Evaluation for One-of-a-Kind Systems

For the purpose of this paper, the directive provides the T&E policy baseline and justifies the importance of the results of test and evaluation in the decision process and the necessity to properly plan and coordinate such testing through official documentation. First, the directive emphasizes that (3:2) :

" Acquisition schedules will be based, inter alia, upon accomplishing test and evaluation milestones prior to the time that key decisions which would commit significant added resources are to be made."

Secondly, it directs that a Test and Evaluation Master Plan (TEMP) be developed for each program as follows (3:6) :

" The DoD Component will prepare as early as possible in the acquisition process, and prior to initiation of Full-Scale Development, an overall test and evaluation plan to identify and integrate the effort and schedules of all T&E to be accomplished and to insure that all necessary T&E is accomplished prior to key decision points. The TEMP will be kept current by the DoD Component."

Accordingly, this paper will propose a structured information system which consolidates the milestone dates and key planning data that is contained in this TEMP. At this moment, DoD Directive 5000.3 is being revised as a result of changes in the acquisition process brought on by

the issuance of new DoD Directives 5000.1 and 5000.2 in January 1977. It is understood that the proposed new 5000.3 will provide greater emphasis and visibility to the TEMP and the importance of its planning and implementation role. The contents of the TEMP and, more specifically, the T&E milestones to be tracked, will be discussed in more detail in Sections 3.4 and 5.2 .

2.3 SECRETARY OF THE NAVY (SECNAV) POLICY

2.3.1 SECNAVINST 5000.1

At the next lower echelon within DoD, SECNAVINST 5000.1 reflects the SECNAV policy in response to DoD Directives 5000.1 and 5000.2. Again, this is general policy with the details left to the Chief of Naval Operations (CNO) to develop and implement (discussed in Section 2.4). Basically, the SECNAV Instruction recognizes that (4:13) :

" The wide variety of naval weapons dictates varying approaches to the conduct of test and evaluation; such effort shall be tailored to the needs and characterizations of each individual acquisition -- prime consideration being given to adequate operationally oriented testing"

The directive further establishes a general sequence of events within the Navy T&E process, discusses the importance of operational T&E (OT&E), and applies T&E policy to new acquisitions including those not subject to the thresholds of DoD Directive 5000.1.

Although SECNAVINST 5000.1 does not specifically discuss the TEMP or required Navy T&E milestones to be included, the concept of proper milestone planning and coordination throughout the process is reflected by the following statement (4:14) :

" Test and evaluation effort shall be effectively correlated with previously outlined requirements concerning approval of material for service use. Specifically, the procedural aspects of requirements determination, research and development, manufacture of service test model(s), technical evaluation, initial operational test and evaluation, full operational evaluation and approval for service use shall be correlated. "

2.4 CHIEF OF NAVAL OPERATIONS (CNO) ACQUISITION POLICY

2.4.1 OPNAVINST 5000.42A

In the next echelon of Navy command, the broad SECNAV policy above is further defined and implemented in OPNAVINST 5000.42A of 3 March 1976. The directive basically identifies Navy acquisition management policies, defines the required documentation (such as Navy Decision Coordinating Papers (NDCPs), Operational Requirements (ORs), etc.), establishes review committees and panels, and provides specific outlines and formats for major documentation.

OPNAVINST 5000.42A addresses two significant factors which directly impact upon the concept and implementation of test and evaluation procedures in the Navy. These factors are:

- The establishment of Acquisition Categories (ACATs), and
- The reinforced requirement to prepare and prosecute a Test and Evaluation Master Plan (TEMP).

2.4.2 Acquisition Categories (ACATs)

Navy acquisition programs are divided up into four categories in accordance with specific dollar value thresholds. These categories govern the method and type of acquisition procedures to be applied, and determine respective decision authority levels for each. The following partial criteria are assigned for each category:

- ACAT I
 - Major programs having an estimated:
 - RDT&E cost in excess of \$75 million, or
 - Production cost in excess of \$300 million
 - Decision authority is SECDEF/DEPSECDEF
 - Decision Coordinating Paper (DCP) is normally required

- ACAT II

- Other programs having an estimated:
 - RDT&E cost in excess of \$20 million, or
 - Production cost in excess of \$50 million
- Decision authority is SECNAV
- Program Memorandum is normally required.

- ACAT III

- Programs below the ACAT II level having an estimated:
 - RDT&E cost in excess of \$5 million, or
 - Production cost in excess of \$20 million
- Decision authority is the PROGRAM SPONSER
- Navy Decision Coordinating Paper (NDGP) is normally required

- ACAT IV

- Programs not in ACATs I, II or III having:
 - RDT&E cost less than \$5 million, or
 - Production cost less than \$20 million
- Navy Decision Coordinating Paper (NDGP) is normally required

In addition to the criteria above, programs below the ACAT III (i.e. ACAT IV) dollar thresholds may be designated as ACAT III programs if they directly affect the military characteristics of ships, aircraft, or other combatant units; or if they require operational testing to support key program decisions, or require fleet RDT&E support. A knowledge of these acquisition categories is also important in understanding test and evaluation policy since they govern whether or not a TEMP is required.

2.4.3 TEMP Requirement

OPNAVINST 5000.42A emphasizes that the Test and Evaluation Master Plan (TEMP) is the controlling management document which defines test and evaluation for each navy acquisition program and indicates that

it is to be prepared in accordance with the primary implementing document OPNAVINST 3960.10. Section 2.5.2 discusses the structure of the TEMP in more detail.

2.5 CHIEF OF NAVAL OPERATIONS (CNO) TEST AND EVALUATION POLICY

2.5.1 OPNAVINST 3960.10

This instruction is the primary Navy document for implementing the DoD test and evaluation policies set forth in DoD Directive 5000.3.

In addition, the instruction:

- Defines the T&E responsibilities for the major participants
- Establishes internal procedures for the planning, conducting and reporting of T&E efforts, and
- Delineates the complimentary relationship existing between DT&E and OT&E during the life of an acquisition program.

But most importantly as far as this study project is concerned, OPNAVINST 3960.10 describes in detail the requirements for the preparation of two significant T&E documents:

- A Test and Evaluation Master Plan (TEMP)
 - Discussed in Section 2.5.2
- Certification of Readiness for OPEVAL
 - Discussed in Section 2.5.3

2.5.2 Test and Evaluation Master Plan (TEMP)

2.5.2.1 General Description

The TEMP is a short, concise master planning document which describes the test and evaluation effort for a particular ACAT I, II or III program. Its specific purposes, as stated in OPNAVINST 3960.10 (6:Encl 3) are :

- To direct and control the accomplishment of adequate T&E
- To identify all required T&E resources
- To facilitate long-range planning, programming and budgeting

- To eliminate redundant testing, and
- To reduce Fleet RDT&E Support requirements to the essential minimum

The TEMP is the controlling T&E management document and, as such, contains the total integration of requirements for both the Developing Agency (DA) for DT&E, and for COMOPTEVFOR for OT&E, and the integration of schedule and resources required for accomplishment. Cost and time implications are clearly spelled out to permit reviewers to assess the resources being committed to test and evaluation.

2.5.2.2 Format

The TEMP is limited to 20 pages or less in length and contains sufficient detail on how and when identified or suspected uncertainties will be resolved. In order to provide consistency in the type of information and level of detail provided, all TEMPs are prepared in accordance with the following general outline:

- PART I. ADMINISTRATIVE INFORMATION
- PART II. DESCRIPTION
- PART III. INTEGRATED SCHEDULE
- PART IV. DT&E OUTLINE
- PART V. OT&E OUTLINE
- PART VI. PAT&E OUTLINE (If Applicable)
- PART VII. RESOURCE SUMMARY
- PART VIII. REFERENCES

A further breakdown of this outline, illustrating the next level of detailed information to be included, is provided in Appendix A of this report.

Each TEMP is assigned a number which is the same as the T&E Identification Number (TEIN) assigned by CNO (OP-983) and as listed in a quarterly document entitled "CNO Index of Acquisition Programs" (10).

2.5.2.3 Temp Preparation and Submission

The detailed TEMP preparation, submission criteria and procedures are beyond the scope of this report and the reader should refer to OPNAVINST 3960.10 and local command implementing directives for further details. However, the following specific items are cited in order to provide a better appreciation of the purpose of the TEMP (6:7&8) :

- CNO-approved TEMPs are required for all ACAT I, II and III programs. For ACAT IV programs, the Chief of Naval Material (CHNAVMAT) has promulgated instructions for the preparation and approval of Test and Evaluation Plans (TEPs), as discussed in Section 3.2.1.2.
- TEMPs are prepared by the Developing Agency (DA) in coordination with other DA codes (for internal review); with COMOPTEVFOR (for finalizing the OT&E Outline); and with NAVMAT (for review and comments). A smooth TEMP is then prepared and forwarded to CNO.
- The approval of the TEMP constitutes CNO direction to conduct the T&E program defined therein. Resultant test plans will be consistent with TEMP provisions.
- The TEMP will be reviewed and updated at least annually and about two months prior to major decision milestones (DSARC or equivalent) to incorporate significant results achieved and changes to plans and milestones.

2.5.2.4 TEMP Application to Report Objective

A brief description of the NAVMAT/SYSCOM T&E organization will be provided in Section 3.0. A requirement will be expressed

within that framework to properly identify, make visible and coordinate information concerning T&E milestone data contained in PART III of the TEMP (Integrated Schedule). Section 5.0 will propose the development of an information system with an input data format consistent with the structure of milestone information in the TEMP.

2.5.3 Certification of Readiness for OPEVAL

Before a system or equipment can be tested in the final phase of OT&E (OT-IIIb "OPEVAL"), prior to a production decision at DSARC III, it must be certified by the Developing Agency that it has successfully completed the final phase of DT&E (DT-IIIb "TECHEVAL") and that it is "ready for OPEVAL". This certification is submitted to CNO in the form of a report addressing full compliance to certification criteria, or requesting waivers for minor items. A complete listing of such criteria is found in Enclosure (2) of OPNAVINST 3960.10, and are summarized as follows:

- DT&E objectives have been met
- High probability of successful OPEVAL performance exists
- Adequate logistics support has been provided (plans, spare parts, manuals, etc)
- Personnel manning approximates operating conditions
- Representative training has been conducted
- System configuration is equivalent to the intended production system

The Certification of Readiness for OPEVAL is a significant test and evaluation milestone for the Developing Agency and, as such, will be considered as a key data point in the test and evaluation information system being proposed in this paper.

2.6 APPROVAL FOR SERVICE USE (ASU)

In addition to the TEMP, which provides an integrated schedule of T&E milestones, and the requirement for Certification of Readiness for OPEVAL, all systems or equipments developed by the Navy and/or which the Navy intends to support must be "approved for service use" prior to commitment to major production. This requirement is directed by OPNAVINST 4720.9D, and certain provisions of that instruction are provided in the following subsections.

2.6.1 Full Approval for Service Use (ASU)

Commonly referred to as just "ASU", this approval is the total and complete approval required in order to release production funds. The requirement is defined as follows (7:6) :

" No new system or significant alteration to an existing system shall be approved for production until it has been adequately tested, proven operationally suitable, and determined to be logistically supportable."

2.6.2 Provisional Approval for Service Use (PASU)

If a particular system or equipment is to be produced in limited quantity initially, as a result of a DSARC II decision or on the basis of a CNO Evaluation Board (CEB) decision, then the following provision of OPNAVINST 4720.9D applies (7:5) :

" A 'provisional approval' may be sought on programs for which sufficient operational testing to support a final determination of approval for service use cannot practically be accomplished prior to making an initial production commitment."

2.6.3 ASU Application to Report Objective

Again, the detailed procedures and implications of this re-

quirement are not within the scope of this report; however, approval for service use, like certification of readiness for OPEVAL, is another significant key T&E milestone that will be addressed in the T&E information system proposed in Section 5.0, and the brief discussion above was included in order to familiarize the reader with this requirement.

3.0 MANAGEMENT OF T&E MILESTONES WITHIN THE NAVAL MATERIAL COMMAND

3.1 GENERAL

The preceding section outlined the test and evaluation policy hierarchy from the Department of Defense, through the Secretary of the Navy, to the Chief of Naval Operations - the point where basic policy was translated into specific implementing instructions for the Navy establishment. These instructions included the interpretation of policy as applies to unique Navy situations and environments, service-peculiar definitions, documentation and procedures, and particularly the introduction of three significant requirements:

- Test and Evaluation Master Plan (TEMP)
- Certification of Readiness for OPEVAL
- Approval for Service Use (ASU)

This section will describe the general T&E organization of the Naval Material and Systems Commands, and the documentation developed to respond to the implementation direction of the CNO. Again, the intent of this section is not to cover these organizational aspects in great detail. Its only purpose is to acquaint the reader with the environment of NAVMAT T&E coordination, its resources, current capabilities and the continual and increasing need for detailed T&E information by high level management personnel.

3.2 NAVAL MATERIAL COMMAND (NAVMAT)

3.2.1 NAVMAT Documentation

3.2.1.1 NAVMATINST 3960.6A - Test and Evaluation

This instruction implements OPNAV T&E policy within the Naval Material Command and establishes policy guidelines for T&E and for Acquisition Category IV (ACAT IV) programs. Specifically, the instruction:

- Identifies the responsibility to
 - Review program formats
 - Review T&E documentation and plans
 - Insure the adequacy of plans for the support and formal certification of readiness for OPEVAL
- Outlines specific procedures for the preparation, processing and submission of TEMPs (and "TEPs" discussed below)
- Directs that all System Command (SYSCOM) T&E Focal Points (Coordinators) maintain copies of all TEMPs and TEPs under their cognizance (a repository)
- Establishes detailed procedures for ACAT IV T&E plans and program reviews
- Requires the submission of a Test and Evaluation Plan (TEP) for projects below the ACAT III threshold which have:
 - A unit cost of more than \$10,000
 - A total project cost of \$1 million
 - Hardware that requires formal ASU

3.2.1.2 Test and Evaluation Plan (TEP)

The Test and Evaluation Plan (TEP) is the management document which describes and integrates the test and evaluation effort and overall T&E schedule for a program in ACAT IV. Its purpose is to direct and control the accomplishment of adequate T&E, identify required resources

and provide increased T&E visibility for lower cost programs. The TEP is similar in format to the TEMP except there is no operational testing (no OT&E is required for ACAT IV programs) and therefore no OT&E outline required. Other selected elements, depending on the nature of the program, may be excluded from the TEP as long as the basic purpose of the plan is not diluted. The TEP is to be 20 pages or less and is comprised of seven parts (Appendix A TEMP Outline less PART V).

3.2.1.3 NAVMATINST 4720.1 - Approval for Service Use (ASU)

The basic principles for approval for service use were discussed in Section 2.6. The CNO has delegated the authority for approval for service use (ASU) to the Chief of Naval Material (CHNAVMAT) for those equipments and components which fall below the "less than major" dollar value thresholds (essentially less than ACAT I) (9:2). The NAVMATINST 4720.1 series instructions implement the OPNAV policy in this area and provide detailed guidance to material commands including the delineation of approval authority, prerequisites and procedural actions. The ASU milestone is an extremely important date to be closely managed and visibly documented by NAVMAT and SYSCOM T&E Coordinators.

3.2.2 NAVMAT T&E Organization and Functions

It is difficult to "bound" areas of functional responsibilities because of the chain of command concept. That is, even though a particular organization code (office) may be charged with an overall function (like T&E Coordination), there may be only one or two individuals charged with a specific function within that category. A case in point is the T&E Coordinator, or more specifically the individual assigned the responsibility for the coordination of T&E milestones and the management/processing of TEMPs

and TEPs. It would be erroneous to attribute the function to the larger number of personnel within the office itself.

For example, although a number of responsibilities dealing with, and impacting with, test and evaluation efforts within the Naval Material Command reside within Code MAT 08 on the NAVMAT HQ staff, only one individual (NAVMAT Code 08E12) is involved in the daily mechanics of TEMP/TEP coordination and overseeing the numerous SYSCOM T&E functions discussed in Section 3.3.3. He is responsible for insuring that T&E documentation (TEMPS, TEPs, requests for ASU and numerous other correspondence) is submitted in a timely manner, that they contain the required and correct data, and that the documentation has been properly coordinated with and submitted to external activities.

The NAVMAT T&E Coordinator is additionally responsible for maintaining up-to-date status on all such documentation and status on all significant T&E actions within the Naval Material Command of interest to Senior Management officials. This encompassing responsibility, essentially resting on single individuals (including SYSCOMs below), is the major motivating reason for proposing the data information system in Section 5.0 as a management tool to assist these individuals in keeping track of the multitudinous data involved. Hence, the purpose of discussing NAVMAT and SYSCOM T&E Coordinator functions in this section is to provide a measure of justification for this paper.

3.3 SYSTEMS COMMANDS (SYSCOMS)

3.3.1 SYSCOM Documentation

Test and evaluation documentation on a systems command level is basically a re-emphasis of the rather explicit OPNAV policy (OPNAVINST 3960.10), as modified by certain unique requirements (such as TEP preparations). SYSCOM policy directives apply these requirements to the particular command environment and tailor the procedural aspects to individual command structures. SYSCOM T&E directives provide detailed instructions on documentation preparation, review and submission.

3.3.2 SYSCOM T&E Organization

In addition to SYSCOM T&E policy documentation, each command has separately issued an instruction or notice establishing a T&E Coordinator responsible for properly administering required T&E functions, and designating him to act as the command focal point for processing TEMPs, TEPs, approval for service use requests, and so forth. The T&E organizational structure among the SYSCOMs is varied. Without going into great detail, the comparisons below are provided only to illustrate the relative capabilities that exist.

One SYSCOM has established the T&E Coordinator position as a staff code and has assigned one individual to be responsible for all command TEMP/TEP processing, status keeping and problem solving during T&E-type crisis periods. Another SYSCOM, because of a larger scope of T&E efforts involved, has established an office with six or seven people assigned. Not all, however (as pointed out earlier), are involved with the TEMP/TEP/ASU functions alone. A third SYSCOM has established a highly organized test and evaluation structure, headed by a Flag Officer, and composed of a number of clearly defined functions and divisions. Heavy reliance is placed on the

project management structure to respond to the T&E details of their individual programs. Although the requirement to collect and coordinate T&E milestone data still exists on the systems command level, this organization cannot be compared to the "singularly staffed" coordinator functions of the other SYSCOMs and NAVMAT Staff.

3.3.3 SYSCOM T&E Coordinator Functions

Like the mix of organizational structures above, the functions of SYSCOM T&E Coordinators are not all standard since real-world functions are tailored to the individual command requirements. However, certain basic functions are essentially common among the single coordinator positions. Each is basically responsible for those command test and evaluation policies and practices that have a general applicability to all SYSCOM Programs. They are also responsible for the effective utilization of SYSCOM T&E assets and facilities (where applicable), and serve as the central point of contact for all applicable T&E matters. Appendix B provides a detailed listing of specific SYSCOM T&E Coordinator functions. They can be generally categorized as follows:

- Develops and Maintains Command T&E Policies
- Monitors T&E Status and Provides Status Reports
- Provides Assistance to Project Managers and Acquisition Managers in the Preparation of Documentation
- Reviews and Processes TEMPs and TEPs
- Reviews and Processes Requests for Approval for Service Use
- Administers Command T&E Support Funds
- Coordinates T&E Matters with External Activities
- Coordinates Specifically Assigned T&E Programs and Projects
- Manages Command T&E Training and Education Programs

It should be emphasized that these SYSCOM T&E Coordinator functions are primarily a "staff-type" duty within the organization - a focal point of T&E expertise and administrator of general command T&E policy. The next working layer of management exists in the Project Manager/Acquisition Manager organizations themselves, where the "nitty-gritty" details of test and evaluation are planned, coordinated and executed.

3.4 CONTROL OF T&E TEMP/TEP MILESTONE DATA

3.4.1 The Requirement

The Program/Project Manager (PM) organization normally has at least one position designated as a T&E manager. If that function is not being implemented or monitored by a full-time designated individual, at least he will appoint someone to perform additional duty in that area. If the PM organization is small and/or personnel resources are sparse, and workload prevents the assignment of a specific T&E function, the effort is performed as an integral part of each divisional task and overall T&E status is monitored by the PM himself. The message is that, no matter how it is performed, the T&E function is never deferred totally. Although the proper amount of testing "eats" money and is a planning and schedule headache, it is recognized that it is a directed effort and highly visible within DoD. Successful T&E is one key to a successful DSARC.

Accordingly, the Project Manager is normally up to speed at any point in time on the status of his program's T&E effort. He is well aware of all the technical details, what might slip, what has slipped, what the time and cost impacts are, what actions are necessary to correct situations, etc. There would appear to be no need for personnel external to his organization to require any detailed data of that sort, particularly lest he consider himself vulnerable to being managed by another layer of organizational codes.

The entity called the Systems Command is a corporation within itself. It must speak with a cohesive corporate voice to the external world, ---- that be in the form of CHNAVMAT, CNO, SECNAV, SECDEF or any number of other commands contacted formally or informally during the course

of daily business. Not only is the Systems Commander the normal chartering agency for all of the Project Offices within his command, he is also the Head of Procuring Activity (HPA) in the contract arena, and also owns the Comptroller as well. His involvement is clear and he requires an across the board assessment of the integrated status of all his program responsibilities so that his "corporate voice" is consistent, viable and credible.

It is particularly important, therefore, that certain test and evaluation information be made available to the Systems Commander to support his management posture. Particularly since some test and evaluation milestones have recently become significant hurdles in the acquisition process which command SECNAV and SECDEF attention and need to be made visible at the Flag management level. For instance, Figure 3.1 illustrates some of these decision gates.



Figure 3.1 Mandatory T&E Milestones

The ultimate aim at the end of Full-Scale Engineering Development is a successful DSARC III decision and the release of production dollars. Before production funds can be released, current directives require that the Project Manager provide proof to the Comptroller that the equipment or system involved has been approved for service use. Approval for service use cannot be obtained until a successful OPEVAL has been completed and the independent OT&E Agency (COMOPTEVFOR) has recommended this

action. An OPEVAL cannot be performed until the equipment or system is "certified ready for OPEVAL" in accordance with CNO direction. This certification cannot be requested or granted until a successful TECHEVAL is achieved, and a successful TECHEVAL is dependent upon prior test and evaluation events. So individual T&E milestones, both minor and major, are significantly important to the project and to the systems command as a whole. Failure to achieve one of them in Figure 3.1 CAN HALT THE ENTIRE ACQUISITION PROCESS for a project:

For this reason alone, the Systems Commander must be made aware of a certain level of T&E milestone status. Each Project Manager can individually advise the Commander of the status of his particular program. Significant problems are normally highlighted during weekly review meetings, program reviews, document/correspondence coordination and so forth. When a crisis evolves, the problem is probed in depth and potential solutions receive intensive management. This, however, is not the level of status reporting being referred to. The Systems Commander needs a concise overview of total status, provided regularly, in an understandable format, that communicates intelligible data briefly with some meaning, and represents the total spectrum of T&E status across all PM boundries.

The SYSCOM T&E Coordinator function was established, in part, to provide such information. The following sections discuss his capability to perform this service.

3.4.2 Scope of Data

The Chief of Naval Operations (CNO) issues, on a quarterly basis, a document entitled "Index of CNO Assigned T&E Projects", which lists all programs requiring the submission of a TEMP (i.e. ACAT I-III) (10).

The listing provides the Test and Evaluation Identification Number (TEIN) assigned, the Program Title, Program Element Number, Project Number and OPNAV Sponser Code. The list currently contains approximately 600 programs. In addition, there are approximately 60 ACAT IV programs in existence in NAVMAT which require the preparation of a TEP. Section 5.2 of this paper discusses data (milestone events) contained in Parts I and III of TEMPs and TEPs and identifies over 180 key test and evaluation and acquisition process data points which must be scheduled, coordinated, monitored and executed for each program. Simple mathematics indicates that there are over 126,000 different milestone dates involved with the T&E effort within NAVMAT. This number does not include other acquisition milestones not directly associated with T&E, nor does it include any lesser important T&E milestones, of which there are numerous in-house and contractor associated events at all levels of design and development. For any one SCSOM, the number of KEY T&E milestones could be 50,000 to 100,000. Quite a number for one T&E Coordinator to be aware of!:

3.4.3 Current T&E Coordinator Capability

If Senior Management asked the T&E Coordinator to provide a particular piece of detailed engineering information such as: What module failed in the AN/XXX widget that caused a certain test to fail, they are probably asking the wrong man, and the question should be directed toward the Project Office vice the T&E Coordinator. Similarly, questions concerning a particular milestone impact, funding implications and so forth are more a PM's responsibility to answer since the T&E Coordinator cannot be aware of all the details of everyone's programs. He can, however, on occasion act as a liaison and obtain answers, but this is an inefficient way of

doing business.

If Senior Management asks the T&E Coordinator for status information which cuts across PM or functional boundries such as: How many TEMPs have been written, and how many more are required; or who's having OPEVALs during the next quarter - THIS is the information that should be provided by the T&E Coordinator. He has all the data with which to answer these questions. They are contained in the TEMPs and TEPs in the safe in the corner because the directives have stated that he shall be the "repository" for them all. Unfortunately, in order to be able to ascertain how many OPEVALs are scheduled, he will have to manually search each TEMP, scan 60,000 dates for the 100 asked for, list the information, consolidate it, write it up in matrix and memo form and forward it to the questioner. This effort, in combination with phonecalls to knowledgeable PM personnel and other sources of command information, could conceivably take care of his entire morning. The afternoon could also disappear if another question concerning the number of DT-IIa's we've had this year is asked.

The point is that a manual search of data each time a question is asked takes time. There is no common data base that is continually updated on an as-occurring basis, and no automatic means of generating scheduled reports which might provide the necessary information without being asked. The T&E Coordinator, like everyone else, manages his job by exception and is not afforded the luxury of executing planned functions at specific times - all on schedule. His daily workload is based on a specific number of documents passing through each week, a few unanticipated "what-ifs", and a normal baseline of daily tasks. Rarely is he required to perform all his assigned responsibilities in parallel; nor do all the TEMPs come

in at once for review, nor does he receive an inordinate amount of questions each day.

The purpose of this discussion is to point out that the T&E Coordinator has a daily job to do. He performs his functions as outlined in Appendix B on an as-required basis and manages his daily workload in accordance with the existing priorities at the time. What he is NOT doing, however, is manually generating basic status reports up the chain of command from the data contained in the TEMPS filed in his safe. His status reporting capability is reactionary - responding to specific questions - probably asked because of the absence of the status report in the first place. The T&E Coordinator (normally one person) has not the time or capability to collect and manually structure a meaningful group of T&E status reports on any regular basis.

3.4.4 The Proposed Solution

There is a solution. As indicated above, all the required data is available in one spot. By initially taking the time (with external help) to reformat the information in the existing documents into a computer data base, and then implementing procedures for insuring that the development of additional database information is accomplished each time a new TEMP or TEP is prepared for review and submission, Step One of the solution has been completed. Step Two involves a computer program which essentially "sorts and prints" data onto prescribed output report formats which can be further distributed to cognizant codes.

Before this paper proceeds into the details of a proposed information system, it is recognized that some readers have a natural aversion to any form of computerized "MIS" due to prior bad experiences or a number

of other reasons. Therefore, Section 4.0 will explain the author's perception of an "Information System" as opposed to a normally envisioned Management Information System, and will discuss, in more detail, the methodology behind the proposed T&E computer system. Section 5.0 will then define specific data inputs and output formats achievable with such a system.

4.0 DEVELOPMENT OF AN INFORMATION SYSTEM

4.1 OVERVIEW OF MANAGEMENT INFORMATION SYSTEMS (MIS)

To a number of people, the term "MIS" is an unpopular word. It is synonymous with a stack of smelly paper three feet high that comes into the office once a week and piles up in the corner at the rate of twelve feet per month. The information is not in a form which can be readily used, and to manually translate it would take three times as many people twice as long; so therefore it's useless. "MIS" represents a computer down the hall that costs \$100,000, which could have paid for several extra people in the office because you now need them to help feed the extra input data to the machine each day.

Unfortunately, in this type of situation, the observer is correct. If the computer is not providing the right information, or is providing the right information in the wrong format, it won't be used. Unless a "MIS" is tailored to a specific person, task or job, and the user has had a major voice in its development, the outputs will continue to be office door stops and coffee cup coasters for the life of the system.

Once tailored to the job, a "MIS" can be extremely helpful in alleviating a number of cumbersome, repetitive, menial tasks in the office; eliminating some of the time-eating jobs and releasing the workers to perform more important functional tasks. In a sense, the "MIS" mechanizes a certain portion of the office task. It processes information much faster than human manipulation (provided that the bureaucratic administrative handling doesn't slow down the input/output process), data is easy to update if the proper forms and procedures are implemented, and a number of "what if" games can be played with ease because various permutations of the data base can be extracted and analyzed at the push of a button, provided the computer has

been properly programmed in advance.

On the other side of the coin, however, are factors such as cost (both of hardware and software), hardware maintenance, continuing requirements for program changes (back to cost again!), logistics considerations such as computer location, time sharing, acquisition of supplies and so forth. In addition, there is a tremendous communication barrier. That is, most people just can't walk up to a computer and start talking to it. A knowledgeable interface must be sought in the form of an operator or programmer, and the user must transmit his desires properly, be understood by this interface, and understand what he gets back in return (often in a "foreign" language). Otherwise, the whole exercise is doomed to failure. Again, the major disadvantage to a computerized "MIS" is the inherent human resistance to letting a machine do his thinking and do part of his job, lest he lose it. There is a general mistrust of any system that is not under the complete control of the immediate supervisor or manager.

In addition, most people are aware of the work involved on the input side of the computer like collecting data, structuring it, translating it into proper computer terminology, transcribing it and transmitting it to the machine. In fact, the initial data base effort is often more difficult and time consuming than doing the entire function manually (ONCE!). What people fail to realize is that, once over that initial hump, the flexibility, diversity, speed and cost savings on the output side far outweigh any further maintenance data efforts established. Once the system becomes accepted and routine, the ability to generate any number of structured reports at the push of a button dilutes relative concerns about input work. Most managers think of the initial input work when approached with a new "MIS" and do not appreciate the output benefits once the initial work is done.

4.2 INFORMATION SYSTEM VERSUS MANAGEMENT INFORMATION SYSTEM

The reader has perhaps noticed that any reference to "MIS" has been written in quotation marks. In the author's opinion the word "management" in "MIS" is a *mismuter* (no pun intended!). MANAGEMENT INFORMATION SYSTEMS DON'T MANAGE - PEOPLE DO: The "MIS" only provides data in a form which makes it easier for the manager to manage; not to automatically do his job for him. For this reason the term "MIS" has done a great disservice to its concept and has permanently alienated a number of potential users who were disappointed because their former systems didn't "manage" like they were supposed to.

This paper will emphasize the "IS" aspect - an Information System for test and evaluation; not a Management Information System. The rationale for this statement is the foundation for the purpose of this paper - to provide a consolidated listing of T&E milestone data in easily understandable form. A large number of our management problems (aside from manpower, money and time) are a result of incorrect or untimely information. How many times has a supervisor asked a comprehensive question and it has taken several hours (or days) to answer. Why? Because Mary Jones had part of the answer in her head; Tom Smith entered part of the answer in Book "A" last week but got diverted before he could update Book "B"; and Billy Jean used Book "B" to answer the question. The answer was therefore out of date and incomplete, but the data was in the office IN ONE FORM OR ANOTHER.

This situation exists because information filters into an office via many paths, and it is received and recorded by as many means. Information is documented in primary places where it belongs (logs, records, books, files, etc), seldom in secondary (backup) files, and never in other places.

However, all these places come into play at one time or another in developing information to leave the office. There is never a complete satisfaction or high level of confidence that the information is totally correct at any time because the office personnel know that this data diffusion problem exists. They strive to minimize the error of the output, hoping that some important impacting data has not been overlooked in "Book X". Office personnel wish that all their information could be collected by one person in one big pot in the center of the office, and everytime a task was performed, the up-to-date correct data would always be extracted from the pot with near 100% confidence.

The wish is for an information system - a place where all correct data is stored and extracted. The pot is a computer. The beauty of the system is that a piece of data (assuming it is a correct piece of data) is entered once into the memory and no matter who, for what purpose, for how many times, extracts a number of pieces of data for some reason, the information received is always a correct reflection of the data in the memory. This advantage may not appear too exciting until one has experienced this type of exercise manually a number of times with continually varying levels of input data credibility.

4.3 TEST AND EVALUATION INFORMATION SYSTEM REQUIREMENT

Section 3.4 discussed the need to coordinate and manipulate a number of data elements contained in the collection of Test and Evaluation Master Plans (TEMPS). It described a situation wherein a T&E Coordinator position has been established in a staff capacity to the System Commander with a responsibility to provide detailed summary, coordinative and advisory information on elements of individual Project Manager efforts for which the T&E Coordinator has minimum day to day responsibility or authority over. Section 3.4 additionally pointed out that available T&E Coordinator manpower versus perceived Coordinator functions could be in serious imbalance depending on the circumstances and frequency of desired information by senior management.

The solution to this situation was just discussed, and it is basically a simple one: Create the "pot", collect the inputs, and format and disseminate the outputs. It is not simple from the standpoint of the development of the system itself, but from the fact that a majority of the data inputs are already available to the coordinator in a semi-formatted form (TEMPS and TEPs), and the responsibility for maintaining updated T&E data is already being performed by the Project Manager. What is needed is a scheme to tie this all together - the need, the means and the might! A partial plan of action could be as follows:

- Define the requirement - which this paper serves to accomplish
- Structure the basic input and output data needs - again, this paper refers
- Obtain approval within the command for the implementation of such an information system
- Obtain organizational acceptance of the

concept. The system won't survive if the players don't play and believe in the potential benefits

- Decide on what type of computer support to use, such as
 - Leased (computer external to command)
 - Time Share (with existing in-house system)
 - Buy (dedicated hardware for stand-alone system)
- Obtain funds to support the system
- Identify programming capability and commence communications
- Write implementing instructions to identify necessary responsibilities and procedures once the system is operational
- Prepare input data worksheets for all TEMP data, collect missing data from other sources and insure that follow-on data is to be automatically included in future inputs
- Insure that the test and evaluation personnel in the functional and project management organizations are involved in all evolutions. It is essentially their system.
- Implement and maintain the system
- Obtain feedback on the system and report effectiveness and make necessary changes accordingly

4.4 SUMMARY

Computers are fast becoming a way of life. Within the next ten to fifteen years they will be as common as a calculator or electric typewriter, both in the office and the home. Already the consumer market is beginning to show the signs and is providing desk top commercial computers for less than \$1000. Even Heathkit and Radio Shack have entered the market this year. Government and the business world are being flooded with numerous systems, formerly called "Programmable Calculators" which are giving individual offices their own in-house computer capability right on the manager's desk. They are programmed in Basic Language and often in a form which leads the layman by the hand through a step by step execution of the program. Although rigid guidelines have been imposed within OSD concerning the need, justification and use of computer systems, the day will come when manager's will be able to afford, and choose to use, personal systems to help him do his job better, as he does now by carrying around a \$250 Hewlett-Packard calculator in his briefcase.

The choice of what type of computer system to use in implementing a test and evaluation information system must be made by the individual command based upon current policy, attitudes, manpower, money available and the extent and methods currently employed in utilizing existing computer systems. Whatever system is chosen, the concepts in this paper should be further modified and tailored to the individual characteristics of the machine.

In Section 5.0 a particular test and evaluation information system is proposed. Data inputs, as extracted from the Test and Evaluation Master Plans (TEMPS) are defined and consolidated on an Input Data Worksheet for entry into the computer. Data output reports will be categorized and formatted into specific T&E milestone information packages.

5.0 DEVELOPMENT OF A TEST AND EVALUATION INFORMATION SYSTEM

5.1 Introduction

5.1.1 General

In the preceding section an effort was made to emphasize the flexibility of a computer system to print various tailored outputs when so programmed. Such a system should provide useable information in useable form; that is, provide data which will enable managers to manage better without the system attempting to manage the manager. This section proposes a framework information system for collecting, storing, sorting, printing and distributing test and evaluation data for use by System Command management personnel and Program/Acquisition managers.

In developing an information system, there are a number of actions that appear to happen all at once. As the requirement is recognized and the problem is scoped and tailored, ideas are developed concerning the type of data elements to be considered as inputs to the system and their sources. At the same time "hard copy" output formats are being formulated to display the information in the desired manner. The input-output process is iterative. Some report formats are generated because of the availability of input data, and some input data is sought because of the requirements of the output report. The process expands, reduces and tailors the computer program requirement to fit the exact needs of the user. It is not possible to commit this iterative thinking process to paper. Although this section first develops a concept of input data followed by a concept of output report formats, the two concepts were mutually derived.

5.1.2 Input Comments

Inputs to the information system are primarily extracted from TEMPs and TEPs, and the data is concentrated in two areas of the documents

as follows:

- PART I - Administration Information
(Part II
not
applicable) ●
Contains data concerning the identification of the program, points of contact and applicable documentation.
- PART III - Integrated Schedule
Consists of one page (normally a fold-out) displaying the integrated time-sequencing of all test and evaluation and related key events in the acquisition decision making process.

Three administration categories and twelve integrated schedule categories are further broken down and described in Section 5.2 (Input Data). To facilitate the transfer of these data points from the TEMP/TEP documentation into the computer, Section 5.2 further describes an "Input Data Worksheet", a sample of which is provided as Appendix C to this report.

The manipulation of input data must be flexible. No programs are identical and there is no set of totally common milestones among them. There are, however, a number of core milestones such as DSARCs, OPEVALS, TECHEVALS and the like which are common to most programs. Although the definitions of input data include a varying number of different types of data, these core milestones will be used most frequently in output reports.

In reviewing a number of TEMPs, it is evident that the level of detail of recorded milestones and completeness of entries varies from document to document depending upon the status of the program at the time the TEMP was written. Secondary sources of information must be used in these cases to fill in the missing information.

Lastly, this paper does not attempt to enter the realm of the programmer and the programming language required to make the system work.

Data must be numerically keyed and properly arranged within a matrixed memory bank so that it can be easily found, recalled, inter-related with other data and printed in preprogrammed formats. Section 5.2 does not address these programming requirements when describing input data.

5.1.3 Output Comments

Once the input parameters have been defined, Section 5.3 defines the various types of reports that could be generated as outputs. These reports basically fall into four categories:

- Box Scores
- Program Milestone Listings
- Major Milestone Listings
- Document Update Status

In addition to these types of reports, the information within each category can be sorted and printed in a number of different groupings depending on the form in which the information is desired by senior management. For instance, data can be grouped and printed by:

- Chronological Order of Milestone Data
- Type of Acquisition Category (ACAT I, II, III, or IV)
- Program/Acquisition Management Organization
- Program Elements
- T&E Identification Numbers (TEINs)

Any combination of groupings is possible, and the particular order of data presentation within the primary groupings can also be varied. For instance, Figure 5.1 illustrating a partial report on TEMPs lists the documents in accordance with their ACAT, and further orders the list by PM organization and ascending order of TEIN.

ACAT I :	PMX 103	TEIN 23
		TEIN 45
	PMX 105	TEIN 21
		TEIN 142
ACAT II:	PMX 136	TEIN 102
		TEIN 568
		TEIN 874

Figure 5.1 TEMP Report

The same type of information could very well have been presented in a completely different format as shown by Figure 5.2 below.

<u>PM ORG</u>	<u>PROG ELM</u>	<u>ACAT</u>	<u>TEIN</u>
PMX 103	45876N	I	45
	79352N	I	23
PMX 105	24269N	I	21
	63441N	I	142
PMX 136	47446N	II	568
	61332N	II	102
	73445N	II	874

Figure 5.2 TEMP Report

Here, the same data was provided in columns, but ordered by ascending sequence of project organization. Within that grouping, data was listed by ascending order of program element number. There is a large degree of flexibility in the types of output forms available using the same input data in memory, and reports can be structured in any manner depending upon what management wants to primarily focus on.

The availability of so many format permutations drives the system toward a set of "standard displays" which can then be assigned coded number identifications to facilitate their identification and cataloguing. In addition, these output formats can be programmed in advance and called out of the computer as often or as little as required. The entire system and procedure should be designed to minimize operator and management personnel time.

Another feature of the output system is that the time required to prepare and distribute reports is also minimized since the computer can be programmed to print the cover memorandum, complete with date, from, to, subject and distribution codes. The T&E Coordinator need only reproduce the hard copy output of the computer and route to the distribution codes involved.

Sample output reports for each type of proposed format have been developed and included in Appendices D through K, and are discussed in more detail in Section 5.3.

5.1.4 Introduction Summary

This introduction has attempted to give the reader a brief overview of the information process and explain the purpose of the detailed listing of data elements in the following sections. The author firmly believes that, once the initial effort of computer programming and data collection are completed and the system begins normal maintenance and update operations, the advantages gained in having an instant recall of a number of T&E status reports which reflect real-time updated input data, can be a tremendous management aid to the Systems Commands in keeping tabs on the voluminous numbers of T&E events occurring in Project Management and Acquisition organizations.

5.2 INPUT DATA

5.2.1 Administrative Data

As defined in the previous section, administrative data is generally found in Part I of the TEMP or TEP. The administrative data is the key to identifying the program itself and the TEMP in which the milestone data is documented. Most output formats will tend to rely on four or five of these administrative parameters to group data. The input data below will be required for this T&E information system.

5.2.1.1 Identification Data

- TEIN

A "Test and Evaluation Identification Number", normally assigned by CNO to each acquisition program for the life of the program. It also becomes the TEMP number which is usually three digits such as TEIN-383.

- Full Program Title

The title appearing in the TEMP. There are many forms of titles (Program Element Title, Program Short Title, Abbreviated Titles, etc). To be consistent, the data should match the TEMP title.

- Program Element Number

An alpha-numeric number such as "62311N".

- Project Number

A number of varying length and description due to a recent change in numbering systems. Some TEMPs cite both old and new numbers. For consistency, the new nomenclature should be used. Where no number has been assigned, or is unknown, a dummy number should be inserted in the input.

- Acquisition Category

ACAT I, II, III or IV

- RDT&E Fund Level

Maximum rounded-off dollar amount of the RDT&E portion of the program.

- Procurement Fund Level

Maximum rounded-off dollar amount of the procurement portion of the program. (Other funding such as O&MN, MILCON etc., not addressed in TEMP Part I).

5.2.1.2 Points of Contact

The Name, Organizational Code and Telephone Number for each of the following prime points of contact should be included:

- CNO Program Sponsor
- Project Manager
- Acquisition Manager
- Test Director

5.2.1.3 Documentation Data

The Identifying Number and Date of the last version of the following documents should be included:

- Program Memorandum (PM)
- Navy Decision Coordinating Paper (NDCP)
- Decision Coordinating Paper (DCP)
- Operational Requirement (OR)
- Development Proposal (DP)
- Science and Technology Objectives (S&TO)
- Test and Evaluation Master Plan (TEMP) or Test and Evaluation Plan (TEP) - Both original date and latest revision.

This completes the scope of administrative type input data. These inputs are consolidated on an "Input Data Worksheet" discussed in Section 5.2.3 and included as Appendix C to this report.

5.2.2 Integrated Schedule Data

Specific test and evaluation milestone data is found in Part III, "Integrated Schedule" portion of the TEMP or TEP. The milestone data is grouped into twelve categories and, within each category, the milestone dates are

spread throughout a 5 to 8 fiscal year range. For the purposes of this information system, input data will be collected in accordance with the grouping of these categories vice attempting to group them by chronological order or by acquisition phases. The relative phasing (integration) of all milestones will be accomplished by the computer program itself. It is important that the input data collection process be convenient and easily translatable from the TEMP or TEP.

Milestone events will either be characterized as "point" events, with only one date associated with the effort (such as DSARC) or will have a start and complete date associated with an effort of longer scope (such as OPEVAL). The best information should be used in any case. The following sections describe the types of milestone data that will be required for the information system.

5.2.2.1 Major Milestones

- Milestone Ø - Program Initiation
- (N)SARCs - I, II, III
- DSARCS - I, II, III
- Technical Reviews
 - System Requirement Review (SRR)
 - System Design Review (SDR)
 - Preliminary Design Review (PDR)
 - Critical Design Review (CDR)
 - Functional Configuration Audit (FCA)
 - Physical Configuration Audit (PCA)
 - Production Readiness Review (PRR)
- Major Equipment Installations
 - Prototype
 - Production
- Certification of Readiness for OPEVAL
 - Requested
 - Granted

- Provisional Approval for Service Use (PASU)
 - Requested and Granted Dates
- Approval for Service Use (ASU)
 - Requested and Granted Dates
- Program Planning
 - Procurement Plan (PP)
 - Program Management Plan (PMP)
 - System Engineering Management Plan (SEMP)
 - Integrated Logistics Support Plan (ILSP)
 - Source Selection Plan (SSP)
 - Operational Requirement (OR)
 - Development Specification
 - System Specification
 - Product Specification
 - Material and Process Specifications
 - Work Breakdown Structure (WBS)
 - Procurement Request (PR)
 - Request for Proposal (RFP)
- Long-Lead Procurement Items (Including Capital Investment Items)
- Initial Operational Capability (IOC)
- Full Operational Capability (FOC)
- Other Major Milestones as applicable to individual programs.

5.2.2.2 Contract Dates

- Applicable Procurement and RFP Planning above
- Determination and Finding (D/F)
- Response
- Negotiation
- Contract Awards
 - Conceptual
 - Demonstration and Validation
 - Full Scale Engineering Development
 - Pilot Production Model
 - Production
- Applicable Source Selections

5.2.2.3 DCP or NDCP

- Scheduled Updates (Annually)
- Updates Required Prior to NSARC/DSARC

5.2.2.4 TEMP

- Scheduled Updates (Annually)
- Updates Required Prior to NSARC/DSARC

5.2.2.5 Test Articles

- Qualified Parts List (QPL)
- Brassboard
- ADM Delivery
- ADM Test
- EDM Delivery
- EDM Test

5.2.2.6 DT&E

- DT-I
 - Lab
 - Shore
 - At Sea
- DT-IIa
- DT-IIb
- DT-IIIa
- DT-IIIb (TECHEVAL)
- Other specific tests as applicable, such as unique contractor demonstrations, acceptance tests, joint testing, etc)

5.2.2.7 OT&E

- OT-I
- OT-IIa
- OT-IIb
- OT-IIIa
- OT-IIIb (OPEVAL)
- OT-IV (as required)
- OT-V (as required)

5.2.2.8 PAT&E

- As required by the particular program

5.2.2.9 DT&E Test Plan (Start - Draft Due - Final Due)

- DT-I
- DT-II
- DT-IIIa
- DT-IIIb (TECHEVAL)

5.2.2.10 OT&E Test Plan (Start - Draft Due - Final Due)

- OT-I
- OT-II
- OT-IIIa
- OT-IIIb (OPEVAL)

5.2.2.11 DT&E Report (Start - Draft Due - Final Due)

- DT-I
- DT-II
- DT-IIIa
- DT-IIIb (TECHEVAL)

5.2.2.12 OT&E Report (Start - Draft Due - Final Due)

- OT-I
- OT-II
- OT-IIIa
- Quick Look Report
- OT-IIIb (OPEVAL)

This completes the scope of integrated schedule milestone input data. These inputs are additionally consolidated on the following "Input Data Worksheet".

5.2.3 Input Data Worksheet

The amount of data described above appears ominous, but most of it is contained in only two or three pages of the TEMP/TEP and a transfer of this information should be relatively easy. In order to further facilitate such a transfer into the computer data base, and to assist in providing the required information initially as new TEMPs/TEPs are being submitted, an

Input Data Worksheet has been developed and is provided as Appendix C to this paper.

Essentially, the worksheet groups the required data into sections as was done in Section 5.2.2 above, but in addition it provides blank spaces in which to write the applicable data. This creates a level of standardization and consistency to the input process. A sample of the worksheet is illustrated in Figure 5.3 below.

I - ADMINISTRATIVE DATA

1. TEIN: _____
2. Full Program Title: _____

3. Program Element Number: _____
4. Project Number: _____

Figure 5.3 Sample Input Data Worksheet

If the data required by the worksheet blanks is not applicable to the particular program being documented, the term "NA" should be entered on the first two blanks of the data line. If the data is temporarily not available (but will be provided at a later time), the term "TBP" should be entered on the first three blanks of the data line. Dates should be entered with a two digit day, a three letter month, and two digit year (DD MMM YY) such as 05 NOV 78.

When the input data has been entered into the computer, it is stored in memory and available to be sorted, reformatted and printed in specific report outputs which is the subject of Section 5.3 which follows.

5.3 OUTPUT DATA

5.3.1 Report Categories

This section will discuss four types of report categories which would be of interest to Systems Command personnel in managing TEMPs, TEPs, Approval for Service Use status and T&E milestone status in general. The parenthesis after the title indicates the subsection of this report which discusses the format in more detail, and the appendix which provides sample T&E Coordinator reports.

- Box Scores (Section 5.3.6 - Appendices D and E)
General overviews of status.
- Program Milestone Listings (Section 5.3.7 - Appendix F)
Chronological listing of all milestones within a particular program. Essentially a phased ordering of all TEMP/TEP input data.
- Major Milestone Listings (Section 5.3.8 - Appendices G - J)
Selected categories of significant milestones such as DSARCS, OPEVALS, TECHEVALS and so forth.
- Document Update Status (Section 5.3.9 - Appendix K)
Computes required update dates for TEMPs, TEPs and DCPs based on annual and major decision requirements. Can be used for any other document update as well.

5.3.2 Sort Groupings

Within each report category above, there are a number of ways the information can be sorted, printed and presented to the manager for review and interpretation. In fact, it is possible to pick any combination of data elements and prescribe a printout based on that selected grouping. Because of the number of permutations involved, a limited number of data sort groupings have been selected as being the most representative of the types of manually derived lists and of SYSCOM manager's major areas of interest. Therefore, the various report categories above will primarily be

sorted and printed in any one or combination of the following groupings:

- Chronological Order
- ACAT Category (I, II, III or IV)
- Program/Acquisition Manager Organization
- Program Elements
- T&E Identification Numbers (TEINs)

This is not to limit the flexibility of the information system proposed.

Unique manager interest may dictate a number of other sort methods as well.

Managers may desire to review a report of T&E efforts listed by magnitude of RDT&E or Procurement funding, or a listing of all programs under the sponsorship of one particular CNO Program Sponser. The T&E information system and its programmer should remain innovative and flexible in this area.

5.3.3 Preformat Principle

Because it is possible to define the types of reports required and then bound their format with a smaller number of sort combinations, the composite reports can be standardized. The computer programmer can then write specific software to reproduce these standard formats through the use of access codes and create preformatted report outputs. This will alleviate the necessity to reconstruct the form of the report each time the data is to be printed. The same type of data can be presented in any number of different ways depending on the situation, and will always be available at "the push of a button...". The preformatted reports can include a previously designed cover memorandum so that a complete package of information and forwarding documentation can be created in one operation. Samples of this cover memorandum are provided in Appendices D through K as attached to the various sample report formats.

5.3.4 Report Numbering

Since there will be a bounded number of report and sort combinations, each type of report can then be described by certain characteristics which can be related to a numbering system that will facilitate the identification, logging and distribution of the information packages. The illustration below is only one type of numbering system that could be devised. The final system must be tailored to the output formats devised within individual computer programs.

<u>TYPE OF REPORT</u>	<u>REPORT SUBJECT</u>	<u>PRIMARY SORT</u>	<u>SERIAL NUMBER</u>
1. Box Score	1. TEMPs	1. Chronological	Local logging
2. Program MS List	2. OPEVAL	2. ACAT	number system.
3. Major MS List	3. TECHEVAL	3. PM Organization	
4. Document Update	4. ASU	4. Program Element	
	ETC.....	5. TEIN	
		ETC	

Using the system above, Report Symbol 321-08 would indicate that the report is a listing of major milestones (in this case - OPEVALs) that are printed in chronological order. It is either the 8th report sent out this year, the 8th variation of format for this type of information or whatever is chosen for the serial number to represent.

5.3.5 Pseudo Organization

For the purposes of developing sample report outputs, fictitious programs, milestone dates and events, organizations and other data were used. The psuedo organization is the Naval Defense Systems Command (NAVDEF) and its

project management organizations are referred to as "PMXs". The NAVDEF T&E Coordinator is "Code 01T" and other distribution codes and administrative type TEMP data have been manufactured by the author for sample purposes only.

In order to provide continuity in the numbers contained in the sample reports and a viable cross-correlation of the various data, the following matrix of baseline program information was developed which identifies the fictitious NAVDEF components and the number of programs each is responsible for within each ACAT threshold:

<u>ORGANIZATION</u>	<u>ACAT I</u>	<u>ACAT II</u>	<u>ACAT III</u>	<u>ACAT IV</u>	<u>TOTAL</u>
CODE 096	1	0	1	1	3
CODE 03	1	1	2	4	8
CODE 05	1	5	4	3	13
PMX 103	1	2	3	0	6
PMX 105	3	15	9	5	32
PMX 122	2	7	1	4	14
PMX 136	2	6	0	3	11
PMX 142	5	16	16	10	47
TOTAL	16	52	36	30	134

5.3.6 Box Scores

The box score is a status display device designed to give a quick overview of statistics in a particular area of interest. Figure 5.4 illustrates a standard box score format - essentially a matrix which matches

CATEGORY "A"	CATEGORY "B" →						TOTAL
	X	X	X	X	X	X	X
↓	X	X	X	X	X	X	X
TOTAL	X	X	X	X	X	X	X

Figure 5.4 Sample Box Score

two different categories of information and allows a calculation of sub-totals and a "grand total" of the numerical data presented. The advantages of a box score are that:

- It is easy to read.
- It will provide an overall picture of status without having to know many details.
- It is most easily accepted by the "organization" since it displays a minimum of "protected" data.

The box score lends itself most to the display of administrative progress in the T&E environment. The Systems Command Commander is basically interested in overviews of numbers of programs, how many plans have been written or need to be written and so forth. Because individual programs are tailored and involve different time bases, it makes no sense to develop box scores where no commonality exists or where such a tabulation would not transmit usable data. For the purposes of monitoring T&E status, the box score in this system will be used to display the following categories of information:

- Status of TEMPs
- Status of TEPs
- Status of Requests for ASU
- Status of Requests for PASU

Again, this choice is only a starting point for this baseline information system. There are a number of ways the information can be displayed and the choice of what categories to display in the matrix should be determined by individual requirements. In addition, box scores can become more sophisticated (as discussed in Section 6.2) and subsequent generations could include such items as trend analysis and progress assessment by comparing current box score information with previous historical data.

Samples of envisioned Box Score reports have been developed to illustrate the status of fictitious TEMPs, TEPs, ASU and PASU, and are included as Appendices D and E at the end of this report.

5.3.7 Program Milestone Listings

This type of report is essentially a print-out of part or all of the T&E milestones associated with a particular program, arranged in chronological order, but formatted in the following categories:

I - OVERDUE MILESTONES

Focuses management attention on milestones scheduled prior to the report date that have not been reported as complete, and hence have not been transferred to the "Milestones Completed" category (VI below).

II - MILESTONES RESCHEDULED SINCE LAST REPORT

Identifies those milestones which were either previously overdue and rescheduled, originally erroneous, or changed for other reasons. This is a one-time listing since the new dates will be integrated into the proper section in the next report.

III - MILESTONES DUE WITHIN THE NEXT THREE MONTHS

Focuses management attention on eminent events. Consists of a chronological listing of events scheduled for the following three months.

IV - MILESTONES DUE IN THE FOLLOWING TWELVE MONTHS

A longer range chronological projection of milestones scheduled for the following year. This twelve month listing plus III above covers a span of fifteen months total.

V - MILESTONES REMAINING

Lists outyear projection of all remaining known or estimated milestone dates for the remainder of the program. Prepared as an enclosure to the report because of its potential length.

VI - MILESTONES COMPLETED

Chronological listing of milestones previously

completed (for historical purposes and audit trail). Similarly treated as an enclosure due to its potential length nearer the end of the program.

This type of report is not intended to be a regularly prepared and distributed document since one would be required for each of the 50 to 300 programs under the purview of a Systems Command. It does, however, provide a good representation of the scope of a particular program, and can be generated on demand for particular management purposes. A sample of this type of report is included as Appendix F at the end of this report.

5.3.8 Major Milestone Listing

More functional than the preceding Program Milestone Listing, the Major Milestone Listing provides a consolidated report of one particular type of milestone common to all programs. For instance, a "Report of TECHEVAL Milestones" will chronologically list every TECHEVAL currently scheduled. This type of report has a particular appeal to management since it is much shorter, more easily comprehended and is more likely to answer specific areas of questions.

With a "sort and print" concept of computer programming, it is conceivable that any number or type of milestone can be formatted into this type of report and, if anyone were interested, could provide reports on due dates of draft or final test plans, test reports, program plans, contract awards and the like. For the purposes of example, six representative major milestone categories have been chosen as follows:

- DSARCs
- NSARCS
- TECHEVALS
- OPEVALS
- ASUs
- PASUs

This report also lends itself to consolidating categories of information which are the subject of other reports. For example, the Major Milestone Listing format could be used to provide command data on all over-due milestones (Part I of the Program Milestone Listings) or rescheduled milestones (Part II of the same report). Samples of Major Milestone Listing reports are provided as Appendices G through J at the end of the report. These samples were abbreviated in order to illustrate format vice detailed content.

5.3.9 Document Update Status

The last format in the initial version of the T&E information system deals with keeping track of the requirements to update a number of documents at various times throughout the program, either on an annual basis or at other prescribed times. For example, TEMPs are to be updated annually and, if this fact alone were enough, the updating process would be easy to track. However, TEMPs must also be updated (in accordance with OPNAVINST 3960.10) at least two months prior to a major decision point (i.e. DSARC). If a scheduled TEMP update slips, its next annual update is impacted. If the annual update date is close enough to a major decision, only one update might be required. This requirement can be manually tracked for a small number of programs but, if one considers the need to report the current status of 300 programs residing in different program offices, the advantages of this report format become obvious.

The dates provided by this report are computed by the computer by calculating time differences based on the current report date entered. That is, by comparing (DSARC - 2 months) and (Last TEMP Update + 12N) where N=1,2,3 etc years, the next required milestone can be determined.

A sample report is provided as Appendix K at the end of this report, illustrating the status of TEMP/TEP required updates. Again, this sample is abbreviated to illustrate only one format. The report can also be used to provide status on other document update requirements such as:

- DCPs and NDCPs
- Program Management Plans
- System Engineering Master Plans
- ILS Planning

Etc

6.0 SUMMARY

6.1 GENERAL

The preceding section has just described four types of possible reports that could be generated by a computerized information system based on a structured consolidation of data contained in existing Test and Evaluation Master Plan (TEMP) documentation and other acquisition sources. The requirement for such a system is derived from the fact that, although individual Project and Acquisition Managers adequately manage the T&E efforts of their specific programs, very little capability now exists within the Naval Material Command to assess the total picture - that is, to relate on a reliable and regular basis the status of key T&E milestones and the preparation, submission and approval of mandatory T&E documentation. T&E Coordinators have been established to provide such a command function, but no administrative system yet exists that will allow that coordinator to easily display such data in flexible and diverse report formats.

It would be easier if we were able to bypass this coordination function and rely solely on each Project Manager to provide an overview of his program's T&E status to senior management. However, in today's current environment of acquisition policy, the Chief of Naval Material and Systems Commanders now need a more integrated, consistent and regularly scheduled report of T&E status in order to recognize the significance of the T&E effort as a prerequisite for successful DSARC decisions, and to respond (in a corporate sense) to the increasing visibility and importance being placed on test and evaluation events by the CNO, SECNAV, OSD and Congress.

6.2 FUTURE SOPHISTICATION

6.2.1 General

The information system described in this paper is a simple one, and is not designed to provide any profound revelations or create handy decision tools. It is merely a concept - a means to display T&E data in a usable form, to hopefully highlight critical events, and provide an overall identity to the network of inter-related information which would otherwise remain in safe drawers filed neatly away in TEMP folders. The proposed system is a starting point and, as it becomes operational, can be built-upon in a modular fashion and expanded into a more complex and active management tool. The examples contained in the following subsections provide some ideas for the future sophistication of this system.

6.2.2 Trend Capability

As the data is updated, the computer can be programmed to store previous information in accordance with a structured time base. The current data can then be compared with previous data and a trend can be calculated indicating increases, decreases, no changes or whatever indices of progress is desired. This trend analysis can be generated on a short-term basis by comparing only the data from the last report, or on a longer-term basis by comparing cumulative data or historical trend indices.

6.2.3 Graphical Capability

Once a historical data base is achieved, the computer can be programmed to provide a graphical output; a mode which can automatically adjust the range of graph scales in accordance with the scope of data to be plotted and, in some cases, may even be capable of drawing the plot in three or four colors. The graphical capability is most effective in

displaying the cumulative data contained in the Box Score Report. Figure 6.1 illustrates an example of a potential TEMP Box Score graph.

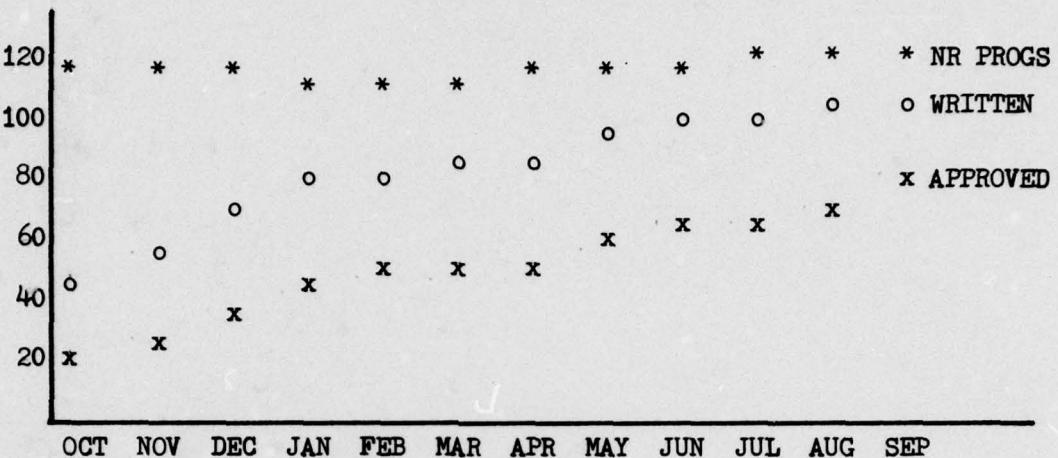


Figure 6.1 TEMP Box Score Status

6.2.4 Chart Capability

As in the above, the computer can also be programmed to provide milestone date information on a chart display in addition to a chronological list. Figure 6.2 provides a sample of how such a chart might look.

MILESTONE EVENT	FY78	FY79	FY80	FY81	FY82	FY83	FY84
	1234	1234	1234	1234	1234	1234	1234
BREADBOARD	S----C						
DT-IIB		S-C					
TECHEVAL			S-C				
OPEVAL				S--C			

Figure 6.2 Milestone Chart Display

Due to space considerations the time scale is in fiscal year quarters and specific dates are not indicated (although the plot could be scaled in months or days for a short-term display). An additional coding scheme on the input data would be required to indicate whether a date was a "start" date or a "complete" date. A more sophisticated chart could be programmed to display both current and historical data for analysis purposes.

6.2.5 Milestone Interactions

Once a set of T&E milestones has been chronologically arranged for each program, it is possible to determine and store the time intervals between selected key milestones (i.e., establish a time relationship between each). If a change in a milestone date occurs, it will disturb the previous order of intervals, and the computer can recompute the network based on the previous relationships and propose a resultant milestone re-structure. This manipulation would be similar to the Performance Evaluation and Review Technique/Critical Path Method (PERT/CPM) used in other computer scheduling evaluations.

The danger with this method is that, in many cases, T&E milestones slip but other dates must remain sacred. Rescheduling of the entire sequence is not done each and every time and certain impact considerations must be weighed in each milestone delay situation. However, the computer can provide a relative indication of critical paths and impacts to be considered during the human analysis phase.

6.2.6 Acquisition Milestones

The data base can be expanded to include more or all of the total acquisition process milestones. Since the method of preparing TEMPs differs from program to program and the term "Major Milestones" in the TEMP schedule format is subject to wide interpretation, the input data described

in Section 5.2 does, in fact, include more milestone dates than normally attributed to the pure T&E process. This was done not only to provide a measure of flexibility in translating existing TEMP data into input data, but also to establish a more detailed frame of reference so that the T&E milestones can be related to the total time framework of the acquisition process. The adding of additional milestones will enable the system to display a total chronological listing of acquisition events for each program. There is a point of departure in this concept, however. The list of potential milestones is never ending and could even extend into the depths of the production process on the contractor's plant floor. A certain measure of common sense is required when establishing the scope of such a data expansion.

6.2.7 Organizational Utilization

The proposed information system, although designed for use by the Command T&E Coordinator to provide an across-the-board assessment of command T&E status, it could also be utilized in more detail within the Project/Acquisition Manager's organization and, in a more general sense, could be applied at the NAVMAT Staff level. That is, those key milestones which identify major events such as ASU, OPEVAL, TECHEVAL and DSARGs, and the administrative data such as TEMP/TEP documentation status. The inclusion of any more detailed technical data would not be feasible at this higher command level since these milestones are less critical, more subject to fluctuation and within the PM's responsibility to manage.

6.3 IMPLEMENTATION

There has been little reference to implementation within this paper other than providing a partial plan of action in Section 4.3. Each command must tailor the system and its implementation to its own unique organization and internal command requirements. It is important to emphasize that, whatever implementing procedures are developed, they should be fully integrated with existing T&E directives and current methods of doing business. The old adage of "Garbage in-Garbage out" will soon overtake the system if care is not taken to avoid the situation. This is particularly true when the system is first implemented because there will be high resistance to any change and to perceived increases in workload.

The maintenance and use of the system should become part of the overall command T&E process. Currently, directives define specific actions to be taken in prosecuting T&E related efforts, even to the point of listing the sequence of internal "chop" codes and approval points. Unless these procedures also include the actions required to insure that the new data is properly inputted to the computer, the system will be bypassed and soon lose credibility due to stale information. It is strongly recommended that once a decision has been made to develop and implement the data base, existing T&E, TEMP/TEP and ASU directives be reissued concurrently with system implementation to insure that the proper data input checks and balances have been provided.

6.4 THE END

The introduction stated that this test and evaluation information system fulfills a particular need. It may not be directly applicable in other command requirements, but it is hoped that some of the concepts proposed may provide a glimmer of thought and may motivate other individuals to develop their own tailored system to solve their own problem. If this happens, this paper has fulfilled its function.

APPENDIX A

TEST AND EVALUATION MASTER PLAN (TEMP)
BASIC FORMAT

PART I. ADMINISTRATIVE INFORMATION

PART II. DESCRIPTION

1. System Description and Mission
2. Critical T&E Issues
3. Objectives and Thresholds
4. Required Technical Characteristics
5. Required Operational Characteristics
6. Environmental Impact Assessment of T&E

PART III. INTEGRATED SCHEDULE

1. Program Milestones
2. Pertinent T&E Data
3. Major Resource Availability Requirements
4. Key Dates for Test Plans and Reports

PART IV. DT&E OUTLINE

1. DT&E to Date
2. Future DT&E
 - a. Equipment Description
 - b. DT&E Objectives
 - c. DT&E Events/Scope of Testing/Basic Scenarios
 - d. Quantifiable Scope of Effort
3. Critical T&E Items

PART V. OT&E OUTLINE

PART VI. PAT&E OUTLINE

PART VII. RESOURCE SUMMARY

1. Test Articles
2. Fleet RDT&E Support
3. Test Sites/Ranges
4. Targets
5. Special Instrumentation

6. Support Equipment
7. Installation/Removal Requirements
8. Expendables
9. Logistics Support
10. Personnel
11. Personnel Training
12. Planned Travel
13. Other (as necessary)

PART VIII. REFERENCES

APPENDIX B

CONSOLIDATED T&E COORDINATOR FUNCTIONS

1. Develops Command Test and Evaluation policies and procedures applicable to the development and acquisition process.
2. Ensures the Command's compliance with higher level requirements.
3. Programs and administers those T&E support funds under T&E coordinator cognizance.
4. Reviews the Command's T&E Master Plans (TEMPS) and T&E Plans (TEPs) for compliance with established criteria.
5. Monitors the status of Command T&E programs and provides status reports to the Command on T&E issues.
6. Maintains liaison with COMOPTEVFOR and other Commands to establish Command priorities for Fleet services to assure coordinated SYSCOM DT&E and OT&E.
7. Reviews all requests from SYSCOM to CNO for T&E project assignments.
8. Reviews "equipment readiness" reports for Command projects assigned to COMOPTEVFOR for test and evaluation.
9. Reviews for the Command requests for Approval for Service Use for compliance with established T&E criteria.
10. Provides guidance on matters of Command T&E policy to field activities supporting T&E programs.
11. Provides guidance and assistance in planning for the use of existing or new Land Based Test Sites and other test facilities.
12. Manages the development and supporting implementation of the SYSCOM portion of the Total Ship Test Program.
13. Provides assistance to Program/Acquisition Managers in the following areas:
 - a. Preparing T&E portions of DSARC, NSARC, and CEB General Board presentations and similar reviews.
 - b. Preparing and updating T&E documentation such as TEMPs, Test Plans, Test Reports, the T&E portion of DCPs, PMs, NDCPs, DPs, APPs, and contract specifications.
 - c. Planning, preparing and justifying T&E budgets.
 - d. Preparing and submitting the T&E Section of Congressional Data Sheets and Program Element Descriptive Summaries.

14. Develops and manages a Command Test and Evaluation training and education program.

APPENDIX C

SAMPLE INPUT DATA WORKSHEET

Refer to Parts I and III of Test and Evaluation Master Plan (TEMP).

Other data may be required from other sources.

Enter dates as follows: 2 digit day - 3 letter month - 2 digit year
(03 NOV 78)

Indicate missing data by providing the following on the blanks:

"NA" - Not Applicable

"TBP" - To be Provided

I - ADMINISTRATIVE DATA (TEMP Part I)

1. TEIN: _____

2. Full Program Title: _____

3. Program Element Number: _____

4. Project Number: _____

5. ACAT: _____

6. RDT&E Fund Level (Mil): _____ . _____

7. Procurement Fund Level (Mil): _____ . _____

8. GNO Program Sponser:

Name: _____

Code: _____

Tel: _____

9. Project Manager:

Name: _____

Code: _____

Tel: _____

10. Acquisition Manager:

Name: _____

Code: _____

Tel: _____

11. Test Director:

Name: _____

Code: _____
Tel: _____

12. Science & Technology Objectives Document (S&TO)

Number: _____
Date: _____

13. Operational Requirement (OR)

Number: _____
Date: _____

14. Development Proposal (DP)

Number: _____
Date: _____

15. Program Memorandum (PM)

Number: _____
Date: _____

16. Navy Decision Coordinating Paper (NDCP)

Number: _____
Date: _____

17. Decision Coordinating Paper (DCP)

Number: _____
Date: _____

18. Test and Evaluation Master Plan (TEMP) (Or TEP)

Date of Original Approval: _____
Date of Latest Revision: _____

II - INTEGRATED SCHEDULE DATA (TEMP Part III)

A. MAJOR MILESTONES

1. Milestone Ø (Program Initiation): _____
2. NSARCS
 - a. NSARC I : _____
 - b. NSARC II : _____
 - c. NSARC III : _____
 - d. NSARC IIIa: _____
 - e. NSARC IIIb: _____

3. DSARCS

- a. DSARC I : _____
- b. DSARC II : _____
- c. DSARC III : _____
- d. DSARC IIIa: _____
- e. DSARC IIIb: _____

4. Technical Reviews

- a. System Requirements Review (SRR): _____
- b. System Design Review (SDR): _____
- c. Preliminary Design Review (PDR): _____
- d. Critical Design Review (CDR): _____
- e. Functional Config Audit (FCA): _____
- f. Physical Config Audit (PCA): _____
- g. Prod Readiness Review (PRR): _____

5. Major Equipment Installations

- a. Prototype : _____
- b. Production _____
- c. Other: _____

6. Certification of Readiness for OPEVAL

- a. Requested: _____
- b. Granted: _____

7. Provisional Approval for Service Use (PASU)

- a. Requested: _____
- b. Granted: _____

8. Approval for Service Use (ASU)

- a. Requested: _____
- b. Granted: _____

9. Program Planning

a. Program Management Plan (PMP)

- Start: _____
- Draft Due: _____
- Final Due: _____

b. System Engineering Management Plan (SEMP)

Start: _____

Draft Due: _____

Final Due: _____

c. Integrated Logistics Support Plan (ILSP)

Start: _____

Draft Due: _____

Final Due: _____

d. Source Selection Plan (SSP)

Start: _____

Draft Due: _____

Final Due: _____

e. Development Specification

Start: _____

Draft Due: _____

Final Due: _____

f. System Specification

Start: _____

Draft Due: _____

Final Due: _____

g. Product Specification

Start: _____

Draft Due: _____

Final Due: _____

h. Material and Process Specifications

Start: _____

Draft Due: _____

Final Due: _____

i. Project Summary Work Breakdown Structure (WBS)

Start: _____

Draft Due: _____

Final Due: _____

j. Contract Work Breakdown Structure (CWBS)

Start: - - - - -

Draft Due: - - - - -

Final Due: - - - - -

k. Request for Proposal (Current)

Start: - - - - -

Draft Due: - - - - -

Final Due: - - - - -

10. Initial Operational Capability (IOC): - - - - -

11. Full Operational Capability (FOC): - - - - -

12. Other Major Milestones

a. - - - - -

b. - - - - -

c. - - - - -

d. - - - - -

B. Contract Dates

1. Contract Awards

a. Conceptual: - - - - -

b. Dem-Val: - - - - -

c. Full Scale Eng Dev: - - - - -

d. Pilot Production Model: - - - - -

e. Production: - - - - -

C. DCP or NDCP

1. DCP Updates: - - - - -

- - - - -

- - - - -

2. NDCP Updates: - - - - -

- - - - -

- - - - -

D. TEMP

1. TEMP Updates: - - - - -

E. Test Articles

1. Brassboard:	-----	-----	-----
2. ADM Delivery:	-----	-----	-----
3. ADM Test:			
Start:	-----	-----	-----
Complete:	-----	-----	-----
4. EDM Delivery:	-----	-----	-----
5. EDM Test			
Start:	-----	-----	-----
Complete:	-----	-----	-----

F. DT&E

1. DT-I Lab			
Start:	-----	-----	-----
Complete:	-----	-----	-----
2. DT-I Shore			
Start:	-----	-----	-----
Complete:	-----	-----	-----
3. DT-I At Sea			
Start:	-----	-----	-----
Complete:	-----	-----	-----
4. DT-IIa			
Start:	-----	-----	-----
Complete:	-----	-----	-----
5. DT-IIb			
Start:	-----	-----	-----
Complete:	-----	-----	-----
6. DT-IIIa			
Start:	-----	-----	-----
Complete:	-----	-----	-----

7. DT-IIIb (TECHEVAL)

Start: - - - - -
Complete: - - - - -

G. OT&E

1. OT-I

Start: - - - - -
Complete: - - - - -

2. OT-IIa

Start: - - - - -
Complete: - - - - -

3. OT-IIb

Start: - - - - -
Complete: - - - - -

4. OT-IIIa

Start: - - - - -
Complete: - - - - -

5. OT-IIIb (OPEVAL)

Start: - - - - -
Complete: - - - - -

6. OT-IV (As Required)

Start: - - - - -
Complete: - - - - -

7. OT-V (As Required)

Start: - - - - -
Complete: - - - - -

H. PAT&E

1. PAT&E (As Required)

Start: - - - - -
Complete: - - - - -

I. DT&E TEST PLAN

1. DT-I

a. Start: - - - - -
b. Draft Due: - - - - -
c. Final Due: - - - - -

2. DT-II

a. Start: - - - - -
b. Draft Due: - - - - -
c. Final Due: - - - - -

3. DT-IIIa

a. Start: - - - - -
b. Draft Due: - - - - -
c. Final Due: - - - - -

4. DT-IIIb (TECHEVAL)

a. Start: - - - - -
b. Draft Due: - - - - -
c. Final Due: - - - - -

J. OT&E TEST PLAN

1. OT-I

a. Start: - - - - -
b. Draft Due: - - - - -
c. Final Due: - - - - -

2. OT-II

a. Start: - - - - -
b. Draft Due: - - - - -
c. Final Due: - - - - -

3. OT-IIIa

a. Start: - - - - -
b. Draft Due: - - - - -
c. Final Due: - - - - -

4. OT-IIIb (OPEVAL)

a. Start: - - - - -
b. Draft Due: - - - - -
c. Final Due: - - - - -

K. DT&E TEST REPORT

1. DT-I

a. Start: - - - - -
b. Draft Due: - - - - -
c. Final Due: - - - - -

2. DT-II

a. Start: - - - - -
b. Draft Due: - - - - -
c. Final Due: - - - - -

3. DT-IIIa

a. Start: - - - - -
b. Draft Due: - - - - -
c. Final Due: - - - - -

4. DT-IIIb (TECHEVAL)

a. Start: - - - - -
b. Draft Due: - - - - -
c. Final Due: - - - - -

L. OT&E TEST REPORT

1. OT-I

a. Start: - - - - -
b. Draft Due: - - - - -
c. Final Due: - - - - -

2. OT-II

a. Start: - - - - -
b. Draft Due: - - - - -
c. Final Due: - - - - -

3. OT-IIIa

a. Start: - - - - - - - - - -
b. Draft Due: - - - - - - - - - -
c. Final Due: - - - - - - - - - -

4. Quick Look Report

a. Start: - - - - - - - - - -
b. Draft Due: - - - - - - - - - -
c. Final Due: - - - - - - - - - -

5. OT-IIIb (OPEVEL)

a. Start: - - - - - - - - - -
b. Draft Due: - - - - - - - - - -
c. Final Due: - - - - - - - - - -

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APPENDIX D

1 OCTOBER 1978

FROM: NAVDEF T&E COORDINATOR (CODE 01T)
TO: DISTRIBUTION LIST

SUBJ: TEMP/TEP BOX SCORE FOR SEPTEMBER 1978

REF: (A) NAVDEFINST 3960.41A

ENCL: (1) TEMP STATUS BY ACAT
(2) TEMP/TEP STATUS BY ORGANIZATION

1. IN ACCORDANCE WITH REFERENCE (A), THE FOLLOWING SUMMARY BOX SCORES ARE PROVIDED, DEPICTING THE STATUS OF TEMP AND TEP PREPARATION AS OF THE END OF SEPTEMBER 1978. FURTHER BREAKDOWNS BY ACAT AND BY ORGANIZATION ARE PROVIDED BY ENCLOSURES (1) AND (2) RESPECTIVELY. (NOTE: PERCENT EQUALS APPROVED/NR PROGS).

TEMP STATUS (ACATS I, II, AND III)

CODE	NR PROGS	WRITTEN	NOT WRITTEN	APPROVED	PERCENT
096	2	1	1	1	50.0
03	4	3	1	1	25.0
05	10	6	4	4	40.0
PMX 103	6	4	2	2	33.3
PMX 105	27	14	13	8	29.9
PMX 122	10	7	3	7	70.0
PMX 136	8	2	6	1	12.5
PMX 142	37	21	16	15	40.5
TOTAL	104	58	46	39	37.5

TEP STATUS (ACAT IV)

CODE	NR PROGS	WRITTEN	NOT WRITTEN	APPROVED	PERCENT
096	1	1	0	1	100.0
03	4	2	2	1	25.0
05	3	3	0	2	66.6
PMX 103	0	0	0	0	00.0
PMX 105	5	0	5	0	00.0
PMX 122	4	2	2	2	50.0
PMX 136	3	2	1	2	66.6
PMX 142	10	6	4	4	40.0
TOTAL	30	16	14	12	40.0

DISTRIBUTION

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- 09
- 090
- 03
- 05
- PMX 103
- PMX 105
- PMX 122
- PMX 136
- PMX 142

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I. M. SWIFT

TEMP STATUS BY ACAT

ACAT I

CODE	NR PROGS	WRITTEN	NOT WRITTEN	APPROVED	PERCENT
096	1	1	0	1	100.0
03	1	1	0	1	100.0
05	1	1	0	1	100.0
PMX 103	1	1	0	1	100.0
PMX 105	3	2	1	1	33.3
PMX 122	2	1	1	1	50.0
PMX 136	2	2	0	1	50.0
PMX 142	5	4	1	3	60.0
TOTAL	16	13	3	10	62.5

ACAT II

CODE	NR PROGS	WRITTEN	NOT WRITTEN	APPROVED	PERCENT
096	0	0	0	0	00.0
03	1	1	0	0	00.0
05	5	4	1	2	40.0
PMX 103	2	1	1	1	50.0
PMX 105	15	10	5	6	40.0
PMX 122	7	6	1	6	85.7
PMX 136	6	0	6	0	00.0
PMX 142	16	14	2	10	62.5
TOTAL	52	36	16	25	48.8

ACAT III

CODE	NR PROGS	WRITTEN	NOT WRITTEN	APPROVED	PERCENT
096	1	0	1	0	00.0
03	2	1	1	0	00.0
05	4	1	3	1	25.0
PMX 103	3	2	1	0	00.0
PMX 105	9	2	7	1	11.1
PMX 122	1	0	1	0	00.0
PMX 136	0	0	0	0	00.0
PMX 142	16	3	13	2	12.5
TOTAL	36	9	27	4	11.1

5
4
ENCLOSURE (1)

TEMP/TEP STATUS BY ORGANIZATION

CODE 090

<u>ACAT</u>	<u>NR PROGS</u>	<u>WRITTEN</u>	<u>NOT WRITTEN</u>	<u>APPROVED</u>	<u>PERCENT</u>
I	1	1	0	1	100.0
II	0	0	0	0	00.0
III	1	0	1	0	00.0
IV	1	1	0	1	100.0
TOTAL	3	2	1	2	66.6

CODE 03

<u>ACAT</u>	<u>NR PROGS</u>	<u>WRITTEN</u>	<u>NOT WRITTEN</u>	<u>APPROVED</u>	<u>PERCENT</u>
I	1	1	0	1	100.0
II	1	1	0	0	00.0
III	2	1	1	0	00.0
IV	4	2	2	1	25.0
TOTAL	8	5	3	2	25.0

CODE 05

<u>ACAT</u>	<u>NR PROGS</u>	<u>WRITTEN</u>	<u>NOT WRITTEN</u>	<u>APPROVED</u>	<u>PERCENT</u>
I	1	1	0	1	100.0
II	5	4	1	2	40.0
III	4	1	3	1	25.0
IV	3	3	0	2	66.6
TOTAL	13	9	4	6	46.1

PMX 103

<u>ACAT</u>	<u>NR PROGS</u>	<u>WRITTEN</u>	<u>NOT WRITTEN</u>	<u>APPROVED</u>	<u>PERCENT</u>
I	1	1	0	1	100.0
II	2	1	1	1	50.0
III	3	2	1	0	00.0
IV	0	0	0	0	00.0
TOTAL	6	4	2	2	33.3

6

5

ENCLOSURE (2)

TEMP/TEP STATUS BY ORGANIZATION (CONT)

PMX_105

<u>ACAT</u>	<u>NR PROGS</u>	<u>WRITTEN</u>	<u>NOT WRITTEN</u>	<u>APPROVED</u>	<u>PERCENT</u>
I	3	2	1	1	33.3
II	15	10	5	6	40.0
III	9	2	7	1	11.1
IV	5	0	5	0	00.0
TOTAL	32	14	18	8	25.0

PMX_122

<u>ACAT</u>	<u>NR PROGS</u>	<u>WRITTEN</u>	<u>NOT WRITTEN</u>	<u>APPROVED</u>	<u>PERCENT</u>
I	2	1	1	1	50.0
II	7	6	1	6	85.7
III	1	0	1	0	00.0
IV	4	2	2	2	50.0
TOTAL	14	9	5	9	64.3

PMX_136

<u>ACAT</u>	<u>NR PROGS</u>	<u>WRITTEN</u>	<u>NOT WRITTEN</u>	<u>APPROVED</u>	<u>PERCENT</u>
I	2	2	0	1	50.0
II	6	0	6	0	00.0
III	0	0	0	0	00.0
IV	3	2	1	2	66.6
TOTAL	11	4	7	3	27.3

PMX_142

<u>ACAT</u>	<u>NR PROGS</u>	<u>WRITTEN</u>	<u>NOT WRITTEN</u>	<u>APPROVED</u>	<u>PERCENT</u>
I	5	4	1	3	60.0
II	16	14	2	10	62.5
III	16	3	13	2	12.5
IV	10	6	4	4	40.0
TOTAL	47	27	20	19	40.4

6

5

ENCLOSURE (2)

APPENDIX E

01 JULY 1978

FROM: NAVDEF T&E COORDINATOR (CODE 01T)
 TO: DISTRIBUTION LIST

SUBJ: ASU/PASU BOX SCORE FOR JUNE 1978

REF: (A) NAVDEFINST 3960.41A

ENCL: (1) ASU STATUS BY ACAT
 (2) ASU STATUS BY ORGANIZATION
 (3) PASU STATUS BY ACAT
 (4) PASU STATUS BY ORGANIZATION

1. IN ACCORDANCE WITH REFERENCE (A), THE FOLLOWING SUMMARY BOX SCORES ARE PROVIDED, DEPICTING THE STATUS OF ASU AND PASU APPROVALS AS OF THE END OF JUNE 1978. FURTHER BREAKDOWNS OF ASU AND PASU BY ACAT AND ORGANIZATION ARE PROVIDED BY ENCL (1) THROUGH (4). (NOTE: PERCENT EQUALS GRANTED/CY ASU SKED).

ASU STATUS (ACATS I-IV)

CODE	NR PROGS	CY ASU SKED	REQUESTED	GRANTED	PERCENT
096	3	0	0	0	00.0
03	8	2	1	0	00.0
05	13	2	2	1	50.0
PMX 103	6	1	0	0	00.0
PMX 105	32	4	3	2	50.0
PMX 122	14	5	4	3	60.0
PMX 136	11	2	2	1	50.0
PMX 142	47	9	9	4	44.4
TOTAL	134	25	21	11	44.0

PASU STATUS (ACATS I-IV)

CODE	NR PROGS	CY ASU SKED	REQUESTED	GRANTED	PERCENT
096	3	1	1	1	100.0
03	8	0	0	0	00.0
05	13	0	0	0	00.0
PMX 103	6	0	0	0	00.0
PMX 105	32	2	1	1	50.0
PMX 122	14	0	0	0	00.0
PMX 132	11	1	1	0	00.0
PMX 142	47	2	1	1	50.0
TOTAL	134	6	4	3	50.0

DISTRIBUTION:

00
09
096
03
05
PMX 103
PMX 105
PMX 122
PMX 136
PMX 142

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ASU STATUS BY ACAT

ACAT I

<u>CODE</u>	<u>NR PROGS</u>	<u>CY ASU SKED</u>	<u>REQUESTED</u>	<u>GRANTED</u>	<u>PERCENT</u>
096	1	0	0	0	00.0
03	1	1	1	0	00.0
05	1	1	1	1	100.0
PMX 103	1	0	0	0	00.0
PMX 105	3	2	2	1	50.0
PMX 122	2	2	2	2	100.0
PMX 136	2	1	1	1	100.0
PMX 142	5	3	2	1	33.3
TOTAL	16	10	9	6	60.0

ACAT II

ETC

ACAT III

ETC

ACAT IV

ETC

ENCLOSURE (1)

ASU STATUS BY ORGANIZATION

CODE 096

<u>ACAT</u>	<u>NR PROGS</u>	<u>CY ASU SKED</u>	<u>REQUESTED</u>	<u>GRANTED</u>	<u>PERCENT</u>
I	1	0	0	0	00.0
II	0	0	0	0	00.0
III	1	0	0	0	00.0
IV	1	0	0	0	00.0
TOTAL	3	0	0	0	00.0

CODE 03

<u>ACAT</u>	<u>NR PROGS</u>	<u>CY ASU SKED</u>	<u>REQUESTED</u>	<u>GRANTED</u>	<u>PERCENT</u>
I	1	1	1	0	00.0
II	1	1	0	0	00.0
III	2	0	0	0	00.0
IV	4	0	0	0	00.0
TOTAL	8	2	1	0	00.0

CODE 05

ETC

PMX_103

ETC

PMX_105

ETC

PMX_122

ETC

PMX_136

ETC

PMX_142

ETC

ENCLOSURE (2)

PASU STATUS BY ACAT

ACAT I

<u>CODE</u>	<u>NR PROGS</u>	<u>CY PASU</u>	<u>SKED</u>	<u>REQUESTED</u>	<u>GRANTED</u>	<u>PERCENT</u>
096	1			1	1	100.0
03	1	0		0	0	00.0
05	1	0		0	0	00.0
PMX 103	1	0		0	0	00.0
PMX 105	3	1		1	1	100.0
PMX 122	2	0		0	0	00.0
PMX 136	2	1		1	0	00.0
PMX 142	5	1		1	1	100.0
TOTAL	16		4	4	3	75.0

ACAT II

ETC

ACAT III

ETC

ACAT IV

ETC

7

6

ENCLOSURE (3)

PASU STATUS BY ORGANIZATION

CODE 096

<u>ACAT</u>	<u>NR PROGS</u>	<u>CY PASU SKED</u>	<u>REQUESTED</u>	<u>GRANTED</u>	<u>PERCENT</u>
I	1	1	1	1	100.0
II	0	0	0	0	00.0
III	1	0	0	0	00.0
IV	1	0	0	0	00.0
TOTAL	3	1	1	1	100.0

CODE 03

<u>ACAT</u>	<u>NR PROGS</u>	<u>CY PASU SKED</u>	<u>REQUESTED</u>	<u>GRANTED</u>	<u>PERCENT</u>
I	1	0	0	0	00.0
II	1	0	0	0	00.0
III	2	0	0	0	00.0
IV	4	0	0	0	00.0
TOTAL	8	0	0	0	00.0

CODE 05

ETC

PMX_103

ETC

PMX_105

ETC

PMX_122

ETC

PMX_136

ETC

6

PMX_142

ETC

ENCLOSURE (4)

APPENDIX F

FROM: NAVDEF T&E COORDINATOR (CODE 01T)
TO: DISTRIBUTION LIST

30 SEPTEMBER 1978

SUBJ: PROGRAM MILESTONE LISTING

REF: (A) NAVDEFINST 3960.41A

ENCL: (1) LIST OF REMAINING PROGRAM MILESTONES
(2) LIST OF PREVIOUSLY COMPLETED MILESTONES

1. IN ACCORDANCE WITH REFERENCE (A), A PROGRAM MILESTONE LISTING IS PROVIDED FOR THE FOLLOWING PROGRAM:

TEIN: 389
TITLE: SUBMERSIBLE SATELLITE SYSTEM
PE: 11186N
ACAT: I
ORG: PMX 103

I - OVERDUE MILESTONES

DATE _____ - EVENT _____

01 SEP 78 - UPDATE ILS PLAN
03 SEP 78 - COMPLETE DT-I AT SEA DEMO
04 SEP 78 - START OT-I
08 SEP 78 - START DT-I TEST REPORT
13 SEP 78 - UPDATE NDCP

II - MILESTONES RESCHEDULED SINCE LAST REPORT

DATE _____ - EVENT _____

02 JUL 78 - FINAL OT-I TEST PLAN DUE
25 JUL 78 - START DT-I AT SEA DEMO

III - MILESTONES DUE WITHIN NEXT THREE MONTHS

DATE _____ - EVENT _____

01 OCT 78 - DRAFT DT-I TEST REPORT DUE
03 OCT 78 - UPDATE PROGRAM MANAGEMENT PLAN (PMP)
07 OCT 78 - UPDATE DECISION COORDINATING PAPER (DCP)
15 OCT 78 - FINAL DT-I TEST REPORT DUE
22 OCT 78 - UPDATE T&E MASTER PLAN (TEMP)
02 NOV 78 - COMPLETE OT-I
04 NOV 78 - START OT-I TEST REPORT
11 NOV 78 - (N)SARC I
18 NOV 78 - DRAFT OT-I TEST REPORT DUE
29 NOV 78 - FINAL OT-I TEST REPORT DUE
11 DEC 78 - COMPLETE BRASSBOARD

III - MILESTONES DUE WITHIN NEXT THREE MONTHS (CONT)

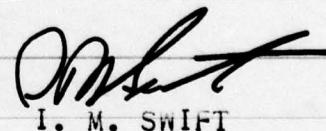
DATE EVENT

12 DEC 78 - COMPLETE SOURCE SELECTION
14 DEC 78 - DSARC I
28 DEC 78 - START DT-II TEST PLAN

IV - MILESTONES DUE IN FOLLOWING TWELVE MONTHS

DATE EVENT

10 JAN 79 - DEMONSTRATION/VALIDATION CONTRACT AWARD
23 JAN 79 - DRAFT DT-II TEST PLAN DUE
10 FEB 79 - DELIVER ADVANCED DEVELOPMENT MODEL (ADM)
18 FEB 79 - FINAL DT-II TEST PLAN DUE
03 MAR 79 - START DT-IIA
24 MAR 79 - START DT-II TEST PLAN
15 APR 79 - DRAFT DT-II TEST PLAN DUE
01 MAY 79 - FINAL DT-II TEST PLAN DUE
12 MAY 79 - START SYSTEM REQUIREMENT REVIEW (SRR)
03 JUN 79 - COMPLETE SYSTEM REQUIREMENT REVIEW (SRR)
10 JUL 79 - COMPLETE DT-IIA
14 JUL 79 - START SYSTEM DESIGN REVIEW (SDR)
14 AUG 79 - START DT-IIA
01 SEP 79 - COMPLETE DT-IIA
03 SEP 79 - START DT-IIB
01 OCT 79 - UPDATE PROGRAM MANAGEMENT PLAN (PMP)
21 OCT 79 - COMPLETE DT-IIB
22 OCT 79 - COMPLETE SYSTEM DESIGN REVIEW (SDR)
23 OCT 79 - START DT-II TEST REPORT
01 NOV 79 - DRAFT DT-II TEST REPORT DUE
08 NOV 79 - START DT-IIB
18 NOV 79 - FINAL DT-II TEST REPORT DUE
01 DEC 79 - COMPLETE SOURCE SELECTION PLAN
15 DEC 79 - COMPLETE DT-IIB
18 DEC 79 - START DT-II TEST REPORT
08 JAN 80 - DRAFT DT-II TEST REPORT DUE
15 JAN 80 - ISSUE REQUEST FOR PROPOSAL (RFP)



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DISTRIBUTION:

00 PMX 103
09 PMX 105
096 PMX 122
03 PMX 136
05 PMX 142

V - LIST OF REMAINING PROGRAM MILESTONES

DATE	EVENT
20 JAN 80	- FINAL OT-II TEST REPORT DUE
16 FEB 80	- UPDATE INTEGRATED LOGISTICS SUPPORT PLAN (ILSP)
22 FEB 80	- ISSUE DEVELOPMENT SPECIFICATION
02 MAR 80	- START DT-III A TEST PLAN
28 MAR 80	- UPDATE NAVY DECISION COORDINATING PAPER (NDCP)
01 APR 80	- UPDATE DECISION COORDINATING PAPER (DCP)
13 APR 80	- UPDATE T&E MASTER PLAN (TEMP)
14 APR 80	- DRAFT DT-III A TEST PLAN DUE
15 MAY 80	- FINAL DT-III A TEST PLAN DUE
30 MAY 80	- (N)SARC II
15 JUN 80	- DSARC II
20 JUN 80	- COMPLETE SOURCE SELECTION
17 JUN 80	- START DT-III A
01 JUL 80	- FULL SCALE ENGINEERING DEV (FSED) CONTRACT AWARD
20 JUL 80	- DELIVER ENGINEERING DEVELOPMENT MODEL (EDM)
01 OCT 80	- UPDATE PROGRAM MANAGEMENT PLAN (PMP)
04 OCT 80	- COMPLETE DT-III A
10 DEC 80	- START OT-III A TEST PLAN
14 JAN 81	- DRAFT OT-III A TEST PLAN DUE
18 FEB 81	- FINAL OT-III A TEST PLAN DUE
22 MAR 81	- COMPLETE DT-III A
18 APR 81	- START OT-III A
10 JUN 81	- PRELIMINARY DESIGN REVIEW (PDR)
13 JUL 81	- COMPLETE DT-III A
02 SEP 81	- START DT-III B (TECHEVAL) TEST PLAN
08 OCT 81	- DRAFT DT-III B (TECHEVAL) TEST PLAN DUE
15 NOV 81	- FINAL DT-III B (TECHEVAL) TEST PLAN DUE
14 DEC 81	- START DT-III B (OPEVAL) TEST PLAN
10 JAN 82	- START DT-III B (TECHEVAL)
18 JAN 82	- DRAFT DT-III B (OPEVAL) TEST PLAN DUE
22 FEB 82	- FINAL DT-III B (OPEVAL) TEST PLAN DUE
15 MAR 82	- ISSUE PRODUCT SPECIFICATION
15 MAR 82	- ISSUE MATERIAL SPECIFICATION
15 MAR 82	- ISSUE PROCESS SPECIFICATION
01 APR 82	- COMPLETE DT-III B (TECHEVAL)
03 APR 82	- START DT-III B (TECHEVAL) TEST REPORT
09 MAY 82	- DRAFT DT-III B (TECHEVAL) TEST REPORT DUE
12 MAY 82	- REQUEST FOR CERTIFICATION OF READINESS FOR OPEVAL
10 JUN 82	- CRITICAL DESIGN REVIEW (CDR)
16 JUN 82	- FINAL DT-III B (TECHEVAL) TEST REPORT DUE
22 JUL 82	- START DT-III B (OPEVAL)
01 OCT 82	- UPDATE PROGRAM MANAGEMENT PLAN (PMP)
04 OCT 82	- COMPLETE DT-III B (OPEVAL)
15 NOV 82	- QUICKLOOK REPORT DUE
14 DEC 82	- FINAL DT-III B (OPEVAL) TEST REPORT DUE

V - LIST OF REMAINING PROGRAM MILESTONES (CONT)

DATE	EVENT
01 JAN 83	REQUEST FOR APPROVAL FOR SERVICE USE (ASU)
14 JAN 83	FUNCTIONAL CONFIGURATION AUDIT (FCA)
28 FEB 83	APPROVAL FOR SERVICE USE (ASU) GRANTED
30 MAR 83	UPDATE T&E MASTER PLAN (TEMP)
10 APR 83	UPDATE INTEGRATED LOGISTICS SUPPORT PLAN (ILSP)
20 APR 83	UPDATE NAVY DECISION COORDINATING PAPER (NDCP)
15 MAY 83	(N)SARC III
20 MAY 83	UPDATE DECISION COORDINATING PAPER (DCP)
10 JUN 83	DSARC III
20 JUN 83	PRE-PRODUCTION CONTRACT AWARD
30 NOV 83	(N)SARC IIIA
15 DEC 83	DSARC IIIA
03 JUL 84	PHYSICAL CONFIGURATION AUDIT (DCA)
12 OCT 84	(N)SARC IIIB
16 NOV 84	DSARC IIIB
25 DEC 84	PRODUCTION CONTRACT AWARD
01 JUN 86	IQC
13 FEB 87	FOC

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ENCLOSURE (1)

VI - LIST OF PREVIOUSLY COMPLETED MILESTONES

DATE EVENT

01 JUL 77	- MILESTONE ZERO - PROGRAM INITIATION
01 SEP 77	- ISSUE SYSTEMS ENGINEERING MGT PLAN (SEMP)
01 OCT 77	- ISSUE PROGRAM MANAGEMENT PLAN (PMP)
25 OCT 77	- START DT-I TEST PLAN
03 NOV 77	- ISSUE INITIAL T&E MASTER PLAN (TEMP)
01 DEC 77	- ISSUE SYSTEM SPECIFICATION
13 DEC 77	- ISSUE INITIAL INTEGRATED LOGISTICS SUPPORT PLAN
05 JAN 78	- START BRASSBOARD
08 JAN 78	- START DT-I LAB DEMO
10 JAN 78	- DRAFT DT-I TEST PLAN DUE
14 FEB 78	- START OT-I TEST PLAN
15 MAR 78	- FINAL DT-I TEST PLAN DUE
16 MAR 78	- COMPLETE DT-I LAB DEMO
25 MAY 78	- DRAFT OT-I TEST PLAN DUE

LINE

ENCLOSURE (2)

APPENDIX G

01 NOVEMBER 1978

FROM: NAVDEF T&E COORDINATOR (CODE 01T)
TO: DISTRIBUTION LIST

SUBJ: REPORT OF DSARC MILESTONES

REF: (A) NAVDEFINST 3960.41A

1. IN ACCORDANCE WITH REFERENCE (A), THE FOLLOWING REPORT OF DSARC MILESTONES IS PROVIDED FOR THE MONTH OF OCTOBER 1978:

DSARC I

DATE	ORG	TITLE	PE	TEIN
16 DEC 77	PMX 103	SUBMERSIBLE SATELLITE SYSTEM	11186N	389
06 FEB 78	PMX 122	OVER THE FENCE RADAR	32556N	568
16 JUL 78	05	AUTOMATED COFFEE URN	72690N	888

DSARC II

DATE	ORG	TITLE	PE	TEIN
14 MAR 78	03	WHISTLE THISTLE MISSILE	62458N	461
02 JAN 79	PMX 142	LOW FLYING SUBMARINE HULL	61322N	109
17 NOV 79	PMX 103	SUBMERSIBLE SATELLITE SYSTEM	11186N	389

DSARC III

DATE	ORG	TITLE	PE	TEIN
18 MAY 79	03	WHISTLE THISTLE MISSILE	62458N	461
17 AUG 79	PMX 139	MODULAR GARBAGE GRINDER	56897N	243


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DISTRIBUTION:

00	PMX 103	
09	PMX 105	
096	PMX 122	*** SIMILAR FORMAT FOR NSARC REPORT ***
03	PMX 136	
05	PMX 142	

APPENDIX H

01 MARCH 1978

FROM: NAVDEF T&E COORDINATOR (CODE 01T)
TO: DISTRIBUTION LIST

SUBJ: REPORT OF OPEVAL MILESTONES

REF: (A) NAVDEFINST 3960.41A

1. IN ACCORDANCE WITH REFERENCE (A), THE FOLLOWING REPORT OF OPEVAL MILESTONES IS PROVIDED:

<u>ORG</u>	<u>TITLE</u>	<u>ACAT</u>	<u>PE</u>	<u>COMMENCE</u>	<u>COMPLETE</u>
03	XXX XXXXX XXXXXX	I	11122N	01 JAN 78	03 APR 78
03	X XXX XXXXXXXXXX	II	60679N	14 JUL 78	15 SEP 78
05	NONE				
PMX 103	XXXXX XXXXXX XXX	I	35749N	23 SEP 78	03 DEC 78
PMX 105	XXXXXXX XX XXXXX	III	73970N	14 OCT 78	16 JAN 79

ETC



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DISTRIBUTION:

00	PMX 103
09	PMX 105
096	PMX 122
03	PMX 136
05	PMX 142

*** SIMILAR FORMAT FOR TECHEVAL REPORTS ***

APPENDIX I

25 DECEMBER 1978

FROM: NAVDEF T&E COORDINATOR (CODE 01T)
TO: DISTRIBUTION LIST

SUBJ: REPORT OF APPROVAL FOR SERVICE USE (ASU) MILESTONES

REF: (A) NAVDEFINST 3960.41A

1. IN ACCORDANCE WITH REFERENCE (A), THE FOLLOWING REPORT OF APPROVAL FOR SERVICE USE (ASU) MILESTONES IS PROVIDED:

ORG	TITLE	ACAT	PE	DATE
096	XXX XXXXX XXX X	I	53657N	04 JAN 79
03	AA AAAAA AAAAAAA	III	25447N	16 FEB 79
PMX 103	BBBBBB BBBB BBB	II	33536N	31 MAR 79
PMX 105	XXXXXXXXX XXXXX	I	32557N	15 MAY 79

ETC



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DISTRIBUTION:

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096

03

05

PMX 103

*** SAME FORMAT FOR PASU REPORT ***

PMX 105

PMX 122

PMX 136

PMX 142

APPENDIX J

03 SEPTEMBER 1978

FROM: NAVDEF T&E COORDINATOR (CODE 01T)
TO: DISTRIBUTION LIST

SUBJ: REPORT OF OVERDUE MILESTONES

REF: (A) NAVDEFINST 3960.41A

1. IN ACCORDANCE WITH REFERENCE (A), THE FOLLOWING REPORT OF OVERDUE MILESTONES IS PROVIDED:

ORG	TEIN	PE	ACAT	EVENT	DATE
096				NONE	
03				NONE	
05	405	49672N	I	UPDATE TEMP	03 OCT 77
PMX 103	587	49572N	II	FINAL DT-II TEST PLN	18 JUL 78
PMX 105	779	88905N	IV	COMMENCE DT-I	21 JUL 78
PMX 122	634	11325N	III	CRITICAL DESIGN REV	25 JUL 78
PMX 136				NONE	

ETC



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DISTRIBUTION:

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PMX 103
PMX 105
PMX 122
PMX 136
PMX 142

APPENDIX K

05 FEBRUARY 1978

FROM: NAVDEF T&E COORDINATOR (CODE 01T)
 TO: DISTRIBUTION

SUBJ: TEMP/TEP UPDATE STATUS REPORT

1. BASED ON THE REQUIREMENT TO UPDATE TEMPS/TEPS ON AN ANNUAL BASIS AND ALSO TWO MONTHS PRIOR TO MAJOR DECISION POINTS, THE FOLLOWING DOCUMENTS WILL REQUIRE UPDATING DURING THE NEXT TWELVE MONTHS:

TEMPS (ACATS I, II AND III)

<u>ORG</u>	<u>TEIN</u>	<u>ACAT</u>	<u>DATE</u>	<u>REASON</u>
03	657	III	06 MAR 78	ANNUAL
PMX 142	346	II	03 AUG 78	ANNUAL
PMX 103	113	I	14 SEP 78	DSARC II
096	104	I	30 NOV 78	NSARC I
05	677	I	24 APR 79	DSARC I

TEPS (ACAT IV)

<u>ORG</u>	<u>TEIN</u>	<u>DATE</u>	<u>REASON</u>
03	576	22 FEB 79	ANNUAL
PMX 105	598	03 MAY 79	ANNUAL
PMX 122	391	29 JUN 79	ANNUAL



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DISTRIBUTION:

00
 09
 096
 03
 05
 PMX 103
 PMX 105
 PMX 122
 PMX 136
 PMX 142

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